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BLOODGOOD, JOSEPH C., M.D.

BONNEY, CHARLES W., M.D.

BRADFORD, JOHN ROSE, M.D., F.R.C.P.

GOODMAN, EDWARD H., M.D.

LANDIS, H. R. M., M.D.

PUBLISHED QUARTERLY

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PHILADELPHIA

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Awarded Grand Prize, Paris Exposition, 1900

PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES

EDITED BY

HOBART AMORY HARE, M.D.

PROFESSOR OF THERAPEUTICS AND DIAGNOSIS IN THE JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA
PHYSICIAN TO THE JEFFERSON MEDICAL COLLEGE HOSPITAL; ONE TIME CLINICAL PROFESSOR
OF DISEASES OF CHILDREN IN THE UNIVERSITY OF PENNSYLVANIA; MEMBER
OF THE ASSOCIATION OF AMERICAN PHYSICIANS, ETC.

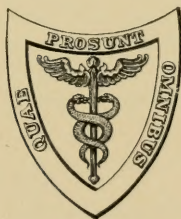
ASSISTED BY

LEIGHTON F. APPLEMAN, M.D.

INSTRUCTOR IN THERAPEUTICS, JEFFERSON MEDICAL COLLEGE, PHILADELPHIA; OPHTHALMOLOGIST TO
THE FREDERICK DOUGLASS MEMORIAL HOSPITAL; INSTRUCTOR IN OPHTHALMOLOGY, PHILA-
DELPHIA POLYCLINIC HOSPITAL AND COLLEGE FOR GRADUATES IN MEDICINE.

VOLUME IV. DECEMBER, 1912

DISEASES OF THE DIGESTIVE TRACT AND ALLIED ORGANS, THE LIVER, PANCREAS
AND PERITONEUM — DISEASES OF THE KIDNEYS — GENITO-URINARY
DISEASES — SURGERY OF THE EXTREMITIES, SHOCK, ANESTHESIA,
INFECTIONS, FRACTURES AND DISLOCATIONS, AND TUMORS
— PRACTICAL THERAPEUTIC REFERENDUM.



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1912



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LIST OF CONTRIBUTORS

JOSEPH C. BLOODGOOD, M.D.,

Associate Professor of Surgery, Johns Hopkins University, Baltimore, Md.

CHARLES W. BONNEY, M.D.,

Assistant Demonstrator of Anatomy in the Jefferson Medical College, Philadelphia.

JOHN ROSE BRADFORD, M.D., F.R.C.P., F.R.S.,

Professor of Medicine in University College and Physician to the University College Hospital, London.

JOHN G. CLARK, M.D.,

Professor of Gynecology in the University of Pennsylvania, Philadelphia.

WILLIAM B. COLEY, M.D.,

Professor of Clinical Surgery, Cornell University Medical School; Attending Surgeon to the General Memorial Hospital; Attending Surgeon to the Hospital for Ruptured and Crippled.

FLOYD M. CRANDALL, M.D.,

Consulting Physician to the Infants' and Children's Hospital; Late Visiting Physician to Minturn Hospital, New York.

EDWARD P. DAVIS, M.D.,

Professor of Obstetrics in the Jefferson Medical College of Philadelphia.

ARTHUR B. DUEL, M.D.,

Professor of Otology, New York Polyclinic Medical School and Hospital; Aural Surgeon to the Manhattan Eye, Ear, and Throat Hospital, and to the Polyclinic Hospital; Otologist to the Babies' Hospital; Consulting Aural Surgeon to the Skin and Cancer Hospital, and to the New York Health Board Hospitals.

WILLIAM EWART, M.D., F.R.C.P.,

Consulting Physician to St. George's Hospital and to the Belgrave Hospital for Children, London.

CHARLES H. FRAZIER, M.D.,

Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the University, Howard, and Philadelphia Hospitals.

JOHN C. A. GERSTER, M.D.,

Instructor in Surgery, New York Polyclinic Hospital and Medical School;
Attending Surgeon to the University and Bellevue Hospital Medical School's
Clinic; Assistant Attending Surgeon to the City Hospital (Blackwell's
Island).

EDWARD H. GOODMAN, M.D.,

Associate in Medicine, University of Pennsylvania; Assistant Physician,
University Hospital and Philadelphia General Hospital; Consultant to
the Medical Dispensary, University Hospital.

WILLIAM S. GOTTHEIL, M.D.,

Adjunct Professor of Dermatology, New York Post-Graduate Medical School;
Consulting Dermatologist to Beth Israel and Washington Heights Hospitals;
Visiting Dermatologist to the City and Lebanon Hospitals, New York City.

EDWARD JACKSON, M.D.,

Professor of Ophthalmology in the University of Colorado; Ophthalmologist
to the City and County Hospital of Denver.

H. R. M. LANDIS, M.D.,

Director of the Clinical Department of the Phipps Institute of the Univer-
sity of Pennsylvania; Associate in Medicine, University of Pennsylvania;
Visiting Physician to the White Haven Sanatorium.

JOHN RUHRÄH, M.D.,

Professor of Diseases of Children and Therapeutics, College of Physicians
and Surgeons; Visiting Physician, Robert Garrett Hospital, Nursery and
Child's Hospital, Mercy Hospital; Consulting Physician, Church Home
and Infirmary, Baltimore.

WILLIAM G. SPILLER, M.D.,

Professor of Neuropathology and Associate Professor of Neurology in the
University of Pennsylvania; Clinical Professor of Nervous Diseases in the
Woman's Medical College of Pennsylvania.

ALFRED STENGEL, M.D.,

Professor of the Theory and Practice of Medicine and Clinical Medicine in
the University of Pennsylvania, Philadelphia.

GEORGE B. WOOD, M.D.,

Surgeon to the Department of the Nose, Throat, and Ear, Howard Hospital;
Assistant Laryngologist, Orthopædic Hospital.

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PROGRESSIVE MEDICINE

DECEMBER, 1912

DISEASES OF THE DIGESTIVE TRACT AND ALLIED ORGANS, THE LIVER, PANCREAS, AND PERITONEUM

BY EDWARD H. GOODMAN, M.D.

DISEASES OF THE MOUTH

Tuberculosis of the Mouth. Tuberculosis of the mouth, according to Redwitz,¹ occurs in two forms: that which is associated with advanced pulmonary tuberculosis, and that which is found when there is either no tuberculosis or but very limited involvement. This second form is called by the French "Maladie d'Isambert." Primary tuberculosis of the mouth must be very rare as the only case so far reported is the questionable one of Paget. In this the infection developed six weeks before death, and although, at autopsy, the lungs were found to be intact, Redwitz claims that in searching for a primary focus the methods used at that time were not so adequate as our modern technique.

The case which Redwitz publishes is not to be considered as one of primary tuberculosis of the buccal mucous membrane, but it presents, nevertheless, certain interesting features which makes it worthy of a review. The patient was a man, aged forty years, with no history of tuberculosis in the family. Five or six years ago he noticed on his right cheek an area of induration which was supposed to be due to carious teeth, several of the latter being afterward extracted. This method of treatment not seeming to remedy matters, an excision of a piece of tissue was made three months later which was diagnosticated carcinoma, but the patient being dissatisfied with this opinion, consulted von Eiselsberg, who performed a second excision and pronounced the induration to be tuberculous. Owing to a recurrence after a year's

¹ Wien. klin. Woch., 1912, p. 238.

time, another excision was done, and for three years there was no return of the trouble, at the end of which time an excavated area appeared on the left cheek. The only clinical feature was pain on contact with food, so that the patient could not chew on that side. Ten days after this area was detected, the lips began to swell, but there were no other objective or subjective symptoms.

The physical examination revealed tuberculosis of both apices so that this is, of course, not a case of primary buccal tuberculosis, but is pertinent, inasmuch as the left cheek was infected three years after the area was excised from the right cheek. Duerat has already called attention to the recurrences seen in this form of tuberculosis, and has given it the name of "*Tuberculeuse buccale à répétition.*"

DISEASES OF THE ESOPHAGUS

Ulcer of the Esophagus. An important paper by Sencert¹ has to do with the discussion of the simple ulcer of the esophagus, a study of this condition being stimulated by an instance of the kind which perforated, caused general peritonitis, but was cured by laparotomy. Ulcers which usually lead to perforation are caused by many factors—traumatism of a foreign body, caustics, esophagitis (diphtheria, scarlet fever, typhoid fever, variola), tuberculosis, syphilis, actinomycosis, dilatation, decubitus, esophageal varices, peptic ulcer, and finally, those caused by carcinoma.

Simple ulcer is very rare, and there is but little known about it, what knowledge we have being of recent date. We find Rokitansky describing, in 1861, peptic ulcers of the esophagus, but, until 1880, no further mention of it could be found in the standard works of pathology. Since then the papers of the subject have multiplied, and full reference to these will be found in Sencert's article.

PATHOLOGIC ANATOMY. The simple ulcer is always found in the inferior portions of the esophagus, although it has been observed as high as the bifurcation of the trachea. The latter instances are generally due to extension of the ulcer upward. There is a great variation in size, and the shape is irregular. They may be situated only on one wall of the esophagus, but may extend around the entire circumference like a ring. Recent ulcers are flat, and the loss of substance affects only the mucosa; the edges are sharp and but slightly elevated, old ulcers are deeper, the base is pale and formed of any of the coats of the esophagus, and even of organs adjacent to the gullet. The edges are bloody and indurated. In a certain number of cases the ulcer spontaneously cicatrizes, and this spontaneous cure is not at all infrequent, as is shown by autopsy records. The recognition of the resulting stenosis is a tribute to the recent developed technique of esophagoscopy.

¹ Arch. gén. de Chirurgie, 1911, vii, p. 1201.

In other cases hemorrhage or perforation are sequences, and with these are associated ulcer in the stomach or duodenum. In 16 cases, 8 had coexisting gastric or duodenal ulcerations.

SYMPTOMATOLOGY. Judging from the reports of cases one might draw the inference that ulcer of the esophagus is purely a postmortem finding, not being recognized unless some complication attracts attention to the esophagus. Four symptoms are, however, of great importance: pain, dysphagia, vomiting, hematemesis.

The *pain* is situated in the epigastric region, sometimes behind the sternum, and may be felt as a sensation of weight, or may be sharp and radiating to the back, shoulders, or hypochondrium. It is spontaneous, and may be elicited by pressure on the epigastric regions, but is especially pronounced in swallowing food.

Dysphagia for solids is marked, and is caused by pain and spasm.

Vomiting is not a true esophageal symptom, and, when present, is probably referable to a gastric or duodenal condition. Later, however, true esophageal vomiting may be seen, and is an indication of evolution of the ulcer.

Hematemesis is valuable in its appearance, amount, and persistence. At times there is but a small amount of red blood, following the swallowing of food, and at times it is black, and associated with melena. Hemorrhage of this kind, coupled with dysphagia, soon bring the patient to an extreme degree of weakness.

Perforation may be into the thorax or into the abdominal cavity. In the first instance death always ensues, and, until the report of Sencert's case, this was the termination of the intra-abdominal perforation.

DIAGNOSIS should be easy if the four symptoms are typically present, and is augmented by a careful endoscopic examination.

As regards **TREATMENT**, it may be *medical* or *surgical*. The aim of the former is to provide rest for the esophagus, and a non-irritating diet. Milk, with the addition of bicarbonate of soda, is the basis of such a regime. Bismuth may be given for the hemorrhage.

Surgical treatment is divided into non-operative and operative. The first consists of touching the ulcer with a solution of nitrate of silver and cocaine. The operation of choice is gastrostomy, which is the one recommended by Sencert.

Medical treatment should be tried if the ulcer is superficial, circumscribed, and moderate in its symptoms, and this treatment is continued if improvement is rapid. If, on the other hand, the ulcer is deep and extended in area, or if medical treatment has not been efficacious, Sencert recommends gastrostomy.

Of great interest in connection with Sencert's paper is an article by Gruber¹ on the statistics of peptic ulcers in the stomach, esophagus,

¹ Münch. med. Woch., 1911, pp. 1668 and 1730.

and duodenum. Under Prof. Chiari's direction, Gruber reviewed the records of 4208 autopsies performed by Chiari from 1906 to 1910. According to Sencert, peptic ulcer of the esophagus is a rare condition; of the 4208 autopsies of Gruber, 170 cases showed peptic ulcers in some part of the intestinal tract. The distribution of these is better understood from the appended table.

OF 170 BODIES WITH PEPTIC ULCER THERE WERE FOUND:

	Total.	Males.	Females.
Ulcus esophagi peptic . . .	6 = 3.5%	2 = 33.3%	4 = 66.7%
Erosio esophagomalacia . . .	9 = 5.3%	2 = 22.2%	7 = 77.8%
Ulc. ventric. peptic. . . .	49 = 28.8%	24 = 48.9%	25 = 51.1%
Cicat. post ulc. vent. pept. . .	21 = 12.4%	10 = 47.6%	11 = 52.4%
Erosio vent. pept.	53 = 31.2%	29 = 54.7%	24 = 45.3%
Ulcus duod. pept.	42 = 24.7%	27 = 65.0%	15 = 35.0%
Cicat. post ulc. duod. pept. . .	3 = 1.8%	3 = 100 %	
Erosio duod. pept.	9 = 5.3%	4 = 44.4%	5 = 55.6%

In view of Sencert's statement that, in his experience, one-half of the cases of esophageal ulcer were associated with other peptic ulcers in the gastro-intestinal tract, it is regrettable that Gruber gives no data on this point. Sencert queried whether, on account of the above noted occurrence, there is not some general systemic state which predisposed to ulceration? In a way, Gruber answers this by showing that of 170 cases of ulcer, 104, or 61 per cent. suffered with cardiovascular changes of some sort, in 63 cases (37 per cent.), tuberculosis was found, and in 13 cases (8.2 per cent.) hepatic cirrhosis was observed.

The article bristles with statistics, and is of great value to those interested in the subject.

A case of peptic ulcer of the cardiac and pyloric ends of the stomach, causing stenosis at their extremities is the contribution of Moorhead.¹ He recognizes the rarity of peptic ulcer of the esophagus, which he offers as an apology for this present report.

Ulceration in this locality is seen first under circumstances which promote a constant contact of esophageal mucous membrane and of gastric juice; such contact occurring in diseases which lead to frequent vomiting, for example, nephritis and chronic gastritis; second, in cases in which dilatation of the stomach, more particularly of the obstructive variety, exists; third, in cases in which ulcers exist in the neighborhood of the cardiac orifice and lead to relaxation of that orifice, although he admits that in many of these cases there is a direct extension from the ulcerated gastric surface.

Miller² publishes notes of a case of perforated ulcer complicated by

¹ Practitioner, 1911, lxxvi, p. 831.

² British Medical Journal, January 20, 1912, p. 116.

Idiopathic Spasm of the Esophagus. Hill¹ is emphatic in his opinion "that purely functional tonic spasm of the gullet, not associated with inflammatory tumefaction, was a condition often heard of, but never seen," and he continues:

"We are asked to believe that a primary, *i. e.*, idiopathic, spasm of unstriated muscle limited to a specially weak area of the esophageal musculature in the region of the cardiac orifice can be the seat of such a degree of primary spasm, whether functional or due to an organic irritative lesion of the pneumogastric nerve, either central or in continuity, as to give rise, in course of time, to hypertrophic stenosis, and subsequently to such marked constriction of the esophagogastric function as to lead to an enormous dilatation of the gullet. One can admit the possibility of organic paresis eventuating in pronounced post-paralytic contracture, but functional paresis (which, in my opinion, is the usual lesion in true functional dysphagia affecting the esophagus) is most unlikely to lead to contracture and other organic changes. The supporters of the spasmodic theory not only postulate a marked spasm at a point where the musculature is very weak, but they also postulate an extremely limited primary spasm which is either tonic or clonic, and they further postulate that this alleged spasm, in course of time, leads to permanent organic changes culminating in a tight stricture and dilatation of the gullet above it. As far as my endoscopic and radiographic observations on the esophagus go, *spasm of a really unyielding nature* is not found even when some spasm admittedly exists as a secondary complication—that is, when it is either symptomatic, as in tumefaction with ulceration, or in the rarer instances of reflex spasm. And further, as regards alleged limited primary spasm in the gullet sufficient to lead to definite dysphagia, not only have I never found any esophagosopic or radiographic evidence of its existence, but I have not even heard of any testimony sufficiently plausible to lead me to consider the conclusions of others as at all convincing. Inferences drawn from radiography alone, *i. e.*, unchecked by esophagoscopy, are obviously inconclusive."

He discusses the peristaltic waves in the esophagus, and while admitting that these may be regarded as a series of intermittent spasm, he insists that this is a thing quite apart from a long-continued state of clonic or tonic spasm of a limited area in the esophageal circular fiber musculature sufficient to lead to marked dysphagia, and later to permanent contraction and to subsequent great dilatation of the viscus above the stenosed region. Those who claim that this does occur assume the presence of a sphincter-like muscle ring at the cardia, which Hill most strenuously denies and quotes authorities at length to support his view. He concludes that functional dysphagia is usually due to *pharyngeal paresis*, rarely to pharyngeal spasm; there may

¹ Journal of Laryngology, Rhinology, and Otology, 1912, p. 76.

occasionally be concomitant paresis of the gullet, in other words, weak peristaltic action, but pure primary spasm of the esophagus, whether functional or organic, is never seen. If the difficulty in swallowing is truly functional, it is probably due either to pharyngeal paresis, or to want of coördination of the muscular movements of deglutition, but, if the difficulty is really located purely in the esophagus, the presumption is that an organic lesion will be found if sought for.

After what seems to me to be well founded arguments in favor of the rarity of idiopathic cardiospasm, it was interesting to read an article by Lerche¹ on the subject, with a report of 17 (?) cases. He says that two groups of diffuse dilatation of the esophagus without anatomical obstruction can be recognized. In one, spasm of the cardia is primary, and the dilatation is secondary. In the other group, atony of the esophageal wall is primary and the spasm secondary. I must confess Hill's arguments appeal to me, and they do so with even greater force after having read Lerche's article. If Hill reads the latter, he must reiterate that he has heard of no testimony sufficiently plausible to lead him to consider the conclusions of others as at all convincing.

Tibbets² reports a case of esophagismus in a man, aged fifty-nine years.

Idiopathic Dilatation of the Esophagus. To show that Hill's teaching is by no means generally accepted, the reader is referred to an article by Mintz,³ which is in the form of a clinical lecture, and to an article by Plummer,⁴ wherein are reported 91 cases. The title of the latter paper is "Diffuse Dilatation of the Esophagus without Anatomical Stenosis (Cardiospasm)," and throughout the extent of his communication the term "cardiospasm" is handled in the loose manner which excited the invective of Hill. I do not intend the previous sentence to be regarded in the nature of a criticism of Plummer's work, as he is entitled to his opinion concerning the existence of cardiospasm, but it must remain a curious coincidence that two authorities, like Hill and Plummer, should hold such divergent views; the former never having seen a case of cardiospasm and the latter reporting on 91 cases (!)

As causes of dilatation of the esophagus, Plummer has collected the following from the literature: Primary cardiospasm (Meltzer, Mikulich), primary atony of the musculature of the esophagus (Rosenheim), simultaneous development of cardiospasm and paralysis of the esophagus brought about by degenerative changes in the vagi (Krause), congenital disposition (Fleiner, Zenker, and Sievers), primary esophagitis (Martin), kinking at the hiatus esophagi, gross lesion of the esophagus or stomach, such as ulcer, carcinoma, etc., congenital

¹ American Journal of Medical Science, 1912, cxliii, p. 415.

² Practitioner, 1911, lxxxvii, p. 236.

³ Archiv f. Verdauungskrankheiten, 1911, xvii, p. 442.

⁴ Journal of American Medical Association, 1912, lviii, p. 2013.

acquired asthemia. The consensus of opinion seems to be that some disturbance of the nerve-muscle mechanism of the esophagus and cardia is responsible for the diffuse dilatation of the esophagus seen in the absence of anatomical stenosis.

The total number of Plummer's esophageal cases amounted to one-hundred and thirty, and he groups his observations regarding their etiology as follows:

1. Diffuse dilatation of the esophagus without anatomic stenosis, 91 cases. No gross gastric lesions were found in this group, and only 5 of the patients were of a neurotic type.

2. Severe cardiospasm without diffuse dilatation of the esophagus, 2 cases. Both patients had periodic attacks continuing from three to four days, during which they were not able to swallow either liquid or solid food. Plummer believes that in these cases diffuse dilatation of the esophagus would have ultimately developed.

3. Cardiospasm without diffuse dilatation, but with gross lesions in the stomach, 12 cases. Of these, 2 patients had ulcer, 2 syphilis, 5 carcinoma, and 3 suspected, but not absolutely demonstrated, ulcer.

4. Mild cardiospasm without diffuse dilatation of the esophagus or gastric lesions, 24 cases. Almost without exception, these patients were of a neurotic type, and many were distinctly hysterical.

Plummer's object in reporting his cases is to describe the treatment by means of a hydrostatic dilator, which will undoubtedly be described under an appropriate section of PROGRESSIVE MEDICINE.

In the discussion which followed the reading of Plummer's paper, Dr. Myer, of St. Louis, raised the objection that without autopsy, anatomical stenosis could not be excluded. This is a point well taken, to be sure, but in view of the very careful measures used by Plummer¹ in establishing his diagnosis, should not be considered a very vital criticism.

A peculiar case of esophageal dilatation in an achondroplastic dwarf is reported by Hichens.² Full clinical notes, with sketches of the organs, and autopsy records make the case one of value to those specially interested in this subject.

A carefully studied series of six cases is reported by Jungerich,³ and as a result of his work, the author is convinced that the principal etiological factor is a neuropathic one. Prognostically the condition *quoad vitam* is not bad, but is serious *quoad restitutionem*. The course of the disease is variable, and there are apt to be periods of good health alternating with periods of great discomfort.

Diverticulum of the Esophagus. Fischer⁴ reports two cases of diverticulum of the esophagus with development of secondary carcinoma in

¹ Journal of American Medical Association, 1911, lvi, p. 560.

² British Medical Journal, February 17, 1912, p. 360.

³ Med. Klin., 1911, p. 1347.

⁴ Archives of Diagnosis, 1912, v, p. 36.

the sac. The two cases were of the type known as Zenker's diverticula (pharyngo-esophageal). According to the author, they are always met with in the posterior wall, and are caused by a continuous pressure from within upon the wall of the gullet. When the pharynx merges into the esophagus there is a triangular area of lessened resistance due to a deficiency in longitudinal fibers of the esophagus at this point, and it is here that the wall of the esophagus is pushed out by constant impact of the morsels of food, especially in people who eat improperly.

Three cases are described by Geiges,¹ all of which were successfully operated upon, and also one case by Jacobs.²

Allison³ reports a case of a patient, aged sixty-one years, who had considerable difficulty in swallowing, the latter being of such a nature that the patient had to push the food out of his mouth, and had to "swallow twice." The right side of his neck always bulged after eating. There was the usual loss of weight and emaciation.

After swallowing a glass of milk, Allison observed this bulging which had always been attributed to the patient's imagination, and found that pressure on the neck area forced milk back into the pharynx with a gurgling sound. Bougies could be passed easily to a distance of eight or nine inches from the incision, but no farther, and a tube could never be passed into the stomach. Surgical treatment was successful.

Carcinoma of the Esophagus. Von Kuester⁴ writes from the standpoint of treatment, and his article interested me, as the surgeons have taught us that they hold out nothing in the way of therapy. It remains for the internist, then, to make the patient as comfortable as possible, and our treatment must fulfil three indications. The patient must not be allowed to starve, he must be kept as free from pain as possible, and he must be kept poorly informed regarding the nature of his condition.

Von Kuester distinguishes two forms of cancer of the cardiac end of the stomach, the hard and the soft, which about correspond to the scirrhus and medullary varieties. There is a difference in the behavior of these, the soft carcinoma breaking down earlier, with profuse hemorrhage, but not occluding (except in very rare instances) the lumen of the esophagus. The scirrhus form, on the other hand, shows marked tendency to cicatricial tissue formation, with the result that stenosis is a prominent feature. A common secondary result is diverticulum formation, which masks in no small degree the bougie examination. Kuester has never observed diverticula in medullary cancer.

As regards the degree of malignancy, one cannot make the hard and fast rule that the scirrhus is relatively the more benign, as is often said of tumors of other structures. It is true that the medullary form grows

¹ Beitr. z. klin. Chir., 1912, lxxviii, p. 139.

² Deutsch. med. Woch., 1912, p. 997.

³ Western Medical Review, 1912, p. 213.

⁴ Med. Klin., 1911, vii, p. 966.

more rapidly, invades the surrounding tissue more quickly, has greater tendency to metastasize, and as a result of the hemorrhage and toxins, leads sooner to cachexia; but with all this there is not the interference with food ingestion such as is seen in the scirrhus cancer.

Of the two, the medullary interferes the less with the activities of the patient, but there are no statistics which show what the duration of life is with either form.

Since the hard variety is more common, Kuester queries whether it is not possible to convert it into the medullary form, and then do away with gastrostomy with its attendant misery and mental effect. He has used, for two years, fibrolysin and bougies. Twice a week the patients received an ampoule of Merck's fibrolysin (2.25 grams) subcutaneously in the epigastrium, and twice a week bougies were used. He selected a whalebone bougie, and later employed the Trousseau sound. The olive tips of the latter were between 5 to 15 mm. in diameter. Any irritation of the tumor is avoided by the soft bougie, and a larger tip is only used when the previous one has been introduced with ease. Eight cases were treated in this way, and all obtained welcome respite from their sufferings.

Although the use of fibrolysin is not without danger, as perforation may follow its employment, in extreme cases such as this, such danger should be disregarded, for, as Kuester rightly says, the object is not to prolong life and its necessary suffering, but to make the few remaining days or weeks of the patient's deplorable existence as comfortable as possible.

Stricture of the Esophagus. With the remarkable personal experience of 100 consecutive cases, the address of Downie¹ attracts more than passing notice. He classifies his cases as benign and malignant.

The BENIGN STRICTURE comprised 72 of the 100 subjects. Three per cent. had what he calls a congenitally narrow gullet, by which he understands narrowing in the neighborhood of the beginning of the esophagus involving all the constituent parts. Its presence is only remarked when the patient swallows tough food, or solid things, like pills and tabloids.

Spasmodic strictures occurred in 24 per cent. of his patients, and Downie believes that it is due to a motor neurosis pure and simple, or that it may be aroused by some organic lesion. The spasm usually takes place at the cardia.

Of *cicatricial stenosis*, he says (contrary to the general view) that there are a goodly number of cases, the exciting causes of which is unknown to the patient. These, he says, are true cicatricial stenoses. The fibrous stenosis are those cases from whom no history of injury can be obtained. He discusses the acids and alkalies which are frequently ingested, and gives clinical notes on the injury following each.

¹ Glasgow Medical Journal, 1912, lxxvii, p. 336.

That syphilis is an infrequent cause of cicatricial stenosis has not been Downie's experience, although McCrae, in Osler's *System*, states that it is very rare. Of Downie's 100 cases, 9 had syphilis, and the majority of cases were in women.

Fibrous strictures made up 20 per cent. of Downie's patients. Although the fauces and pharynx are frequently the seat of acute inflammatory infections (diphtheria, scarlet fever, etc.), the esophagus becomes very rarely involved. Acute esophagitis is less commonly a cause of stenosis than is the chronic form. Excessive alcohol and tea drinking should be inquired into, in patients complaining of dysphagia.

MALIGNANCY occurred in 28 per cent., and the site of the cancer was either close to the beginning of the esophagus or near the cardia, but no part can claim exemption. Downie gives the symptoms of carcinoma, but does not divide the malignant neoplasms into the hard and soft variety, as does Kuester, whose article I have already reviewed.

Of the *methods of examination*, palpation, in cases of simple stricture, affords no information, but, in malignancy of the upper part of the esophagus, there may be felt a fulness behind the cucoid of the trachea. There may also be felt enlargement of the lymph glands.

Auscultation is valueless, and the laryngoscope, the esophagoscope, and the x-rays are the means par excellence of diagnosis.

DIAGNOSIS. In cases of spasm, pure and simple, the age, sex, and temperament of the patient are of importance, also the mutability of symptoms. During the passage of a bougie, it may be firmly grasped by the stricture, but, if it be left in position for a short time, the spasm will be found to pass off, and the bougie can then be gently pressed onward and into the stomach without further trouble.

In cicatricial stricture there is frequently a definite history of injury, or some evidence of syphilis.

In fibrous stricture it may be difficult to determine whether the condition is one of simple fibrosis or an early stage of malignancy. If there is a steady loss of flesh, with increasing dysphagia in a middle-aged or elderly person, suspect carcinoma; if the sound is arrested, the diagnosis is very probable; if there is slight bleeding with the use of the sound, it is all but certain.

PROGNOSIS. Spasmodic cases are readily cured, although the patient may suffer periodic relapses. Cicatricial cases are also amenable to treatment. The prognosis is good in fibrous strictures if the treatment is begun early. In cancer the prognosis is always bad, death ensuing in from three months to two years.

TREATMENT. (a) *Spasmodic Stricture*. The general health must be improved; cold food and acid fluids, also alcohol and tea, should be prohibited. Since there may be a local exciting cause, as hypertrophy of tonsils, uvula, or lingual gland tissue, or conditions in the esophagus

or intestinal tract, these should be investigated and the etiological factor removed, if possible. Bromides, asafetida, valerian, and ipecac are indicated, as is also the passage of a bougie if there is evident dysphagia.

(b) *Fibrous Strictures*. The regular passage of graded bougies is very valuable.

(c) *Cicatricial Strictures*. The above applies with equal force to this form of stenosis, and Downie has used fibrolysin, hypodermically, twice a week. In some cases he found it decidedly helpful.

In the more severe types of stricture, operative procedures are discussed, and will be found in another department of PROGRESSIVE MEDICINE.

Treatment in *malignant stenosis* is palliative, and consists in providing the patient with a sufficiency of nourishment, in soothing pain, and in combatting complications as they may arise (cf. Kuesler). Gastrostomy is not regarded with much favor by most surgeons, yet in desperate cases, Downie has performed it with a certain measure of success.

Esophagomalacia (Autodigestion of the Esophagus). The only case of this kind coming to my notice during the last year was one published by Kernig.¹ The patient was an eighteen-year-old girl, who was admitted to the hospital following an abortion at the third month. On account of fever, and a mass in the pelvis, an operation was decided upon, which, however, was not performed on account of sudden and unexpected collapse of the patient. The pulse was not palpable, and there were signs of peritonitis, although the abdomen was not distended. The patient was in extreme agony, there was an inflammatory area on her chin below the lower lip, and this led to the belief that she had swallowed some poison which had caused perforation of the stomach. Against this diagnosis, however, was the normal appearance of the buccal mucous membrane.

The patient soon died, and, at autopsy, there was found a general peritonitis, but no admixture of gastric or duodenal contents. The lower end of the esophagus was very soft and could not be removed *in toto*, owing to its friability. Kernig believes that, owing to the weakened condition of the patient, the act of vomiting did not expel all of the gastric contents from the esophagus, but that a portion remained and produced autodigestion of that structure.

He classifies this case as belonging to that type described by Zenker and Ziemssen as "intramortale esophagomalacia," which means an autodigestion beginning in the death agony.

A Case of Ruptured Esophagus. In as much as Roy² says that only 30 cases have been reported up to 1903, on account of the rarity of the

¹ St. Petersburg Med. Zeits., 1912, xxxvii, p. 1.

² Lancet, December 23, 1911, p. 1765.

condition, mention is made here of a case. Personally, I feel, after having read Kernig's article on esophagomalacia, that Roy's case belongs in this category. There is, to my mind, an etiological factor in the vomiting, which took place before death, and it is not at all improbable that, some of the gastric juice remaining in the lower portion of the esophagus (the perforation was three inches above the cardia), the autodigestion took place there.

Folds and Webs at the Upper End of the Esophagus. Mosher¹ describes a rare condition of partial webs of congenital or cicatricial origin at the beginning of the esophagus. He reports a case, but gives no symptoms. Dilatation by means of bougies promptly cured the patient.

DISEASES OF THE STOMACH

It is but fitting, in discussing the newer researches along the line of gastric diseases, that the initial place should be given to that master mind in his chosen subject, Professor Boas,² of Berlin. To give the reader the full value of his article, I would prefer that a literal translation of it should be reprinted here, for the benefit of those to whom the original is not accessible. This laudable desire is, unfortunately, impracticable; and this impracticability is regrettable, as the paper is replete with valuable reminiscences of this really first specialist in gastric diseases. The title gives the clue: "The Twenty-fifth Anniversary of Specialism in Gastro-intestinal Diseases. Retrospective and Prospective Views."

He recalls the dark ages of twenty-five years ago when chronic gastritis was the common vessel into which all gastric diseases, not clearly recognized, were thrown. He says, with a touch of sadness not unmixed with irony, that "I remember in 1879, when I was a student in Leyden's clinic, with what wonder we regarded lavage of the stomach, which was done once in a semester for our benefit, and this ten years after Kussmaul's immortal discovery!" How little was known in 1886 of the finesse of gastric diagnosis may be seen from his remarks concerning the features of the various gastric conditions as they were understood twenty-five years ago. With a modesty which only hovers about those who wear the laurel, he says, in regard to his early determination to make gastric diseases his specialty: "I would never have been able to attain my ambition if I had not had, as student, and later as young physician, the good fortune to be initiated into the mysteries of clinical methods and scientific experimentation by my distinguished teacher of physiological chemistry and of clinical medicine, Ewald. A second good fortune was my portion, in having

¹ Laryngoscope, 1911, xxi, p. 1089.

² Archiv f. Verdauungskrankheiten, 1911, xvii, p. 511.

associated with me in my polyclinic, innumerable talented pupils; also in seeing in Berlin, Germany, and then in foreign lands, an interest aroused for this specialty." He mentions the names of men distinguished in this department of medicine, for the reason that he had at first the dread that investigations in gastric diseases would divorce the subject from general medicine. The illustrious list of colleagues is a proof that such a fear was ill founded.

He reviews very briefly the advances in technique, the founding of special societies for the study of gastro-intestinal diseases, and the establishment of journals devoted especially to that subject. A tribute is paid to American medicine and to American literature which will be cherished by those who believe that "a prophet is not without honor in his own country." I recommend Professor Boas' memoir to all, not only on account of its being the reminiscences of a pioneer in gastro-enterology, but on account of the literary charm with which his material is clothed.

The Analysis of Gastric Contents. Under this title Panton and Tidy¹ describe in great detail the analyses of 331 test meals. Some of their conclusions will be welcome to those who have been led to believe that the customary tests now in use are inaccurate, and, in the confusion arising from the controversy over new and old methods, are bewildered, not knowing to which to give the apple of their support. Panton and Tidy summarize very briefly an able paper, and their results show that Günzberg's reagent, and the estimation of total and dimethyl acidity are just as accurate as more elaborate methods, and supply to the clinician all the assistance and information which can reliably be obtained from the chemical examination of gastric contents.

TEST BREAKFASTS. Since the epoch-making experimental studies of Pawlow, we have learned what a very important part the influences of appetite and of food play in the chemical constitution of the gastric juice. It is true that these studies cannot be applied without reservation to man, especially those in which the isolated stomach was used, for, in the latter cases, the pyloric function is not taken into consideration, which must prevent, to some extent, the application of the experiment to human beings. It is also the fact that, in some of these cases of isolated stomach, the acidity of the gastric juice exceeds 5 pro mille, which is never seen in man, owing to the mixture of food, water, and saliva. It must remain for clinical investigation, under the stimulation of the experimental laboratory, to correlate the results of animal experimentation with those obtained in man.

Mintz² discusses the rationale of test breakfasts, and devotes some little time to the criticism of the Boas-Ewald test meal. The chemistry of the gastric juice after this breakfast varies with many factors, which, if not taken into consideration, render the reports worthless. Thus the

¹ Quarterly Journal of Medicine, 1910-1911, iv, p. 449.

² Deutsch. Arch. f. klin. Med., 1911, civ, p. 481.

quantity of the gastric contents depends on the motor functions of the stomach and on the intensity of the secretory function. Also, the acidity must not be regarded only as an index of the secretory function, as the latter is dependent largely on motor function. The composition of the Ewald meal is open to criticism, as the pylorus does not react the same to solids as to liquids. An example of this is seen in achylia gastrica, in which, after a test meal, there is usually a thick, mushy extractum with very little fluid. Although this physical appearance has generally been ascribed to increased motor activities of the stomach it is probably due to the fact that the neutral reacting liquid which enters the duodenum does not give the pylorus the necessary stimulus to cause its closure. The solid food, on the other hand, excites contraction independent of the reaction of the gastric juice, and is retained in the stomach.

Another criticism given by Gruetzner¹ is that one is never certain what part of the contents is extracted, and since the acidity is higher on the periphery than in the centre, it is evident that a content may be obtained consisting of a portion containing free HCl and a portion with no acidity, which, on mixing, combines the free HCl so that none is detected.

The position the patient assumes when the gastric contents are removed is important, and would seem to corroborate Gruetzner's work. Some figures of Borghjörg² are reproduced, which show the difference between the volume and acidity obtained in the sitting and in the recumbent posture.

Sitting.		Recumbent.	
Volume.	Acidity.	Volume.	Acidity
124	28-46	162	14-44
45	54-72	160	24-54
70	16-56	40	0-36
55	18-60	37	0-24
25	40-64	50	12-70
14	30-54	40	8-36

Breakfasts and methods devised to study the secretory function of the stomach have not been eminently successful, and are fairly arraigned by Mintz.

The greatest criticism which can be leveled at any of these breakfasts is made in view of the importance of appetite or the "appetitsaft." Albumin, fat, and starches can, without this, in no way stimulate the gastric juice, but, despite this knowledge, which is shared by all, the test breakfasts are used and reports made without taking it into consideration. Nor does the patient's disgust toward the stomach tube tend to help matters.

¹ Arch. f. Phys., 1905, vol. c.

² Archiv f. Verdauungskrankheiten, 1908, xiv, p. 257.

In order to study the gastric juice under conditions as near normal as possible, Mintz believes the composition of a test breakfast should be based on the following:

1. The test meal must be homogeneous.
2. It must stimulate *ad maximum* the glandular activity of the stomach.
3. This stimulation must act independently of any psychic factor.
4. It must be such that we can calculate the absolute quantity and concentration of the gastric juice.
5. The acidity of the meal must be known.
6. It must contain as little albumin as possible.
7. The gastric contents must, with such a meal, be of a consistency which permits of its complete extraction.
8. The test meal must have a composition and a volume which will exercise the motor function of the stomach the least.

Mintz has selected Liebig's beef extract for his test meal, which has the following composition.

	Per cent.
Water	17.7
Organic substances	61.04
Total nitrogen	9.17
Insoluble and coagulable protein	0.36
Albumose	6.01
Ammonia	0.59
Other nitrogen compounds	54.68

He makes a stock solution by mixing 100 grams of the beef extract with 500 c.c. of boiling water. This is filtered and sterilized. The concentration of the bouillon is measured according to the degree of acidity—5 c.c. mixed with 100 c.c. of water has an acidity of 16–18. Before using it it is mixed with 475 c.c. of warm water and 2 grams of sodium chloride, of which amount the patient drinks 450 c.c., leaving 25 c.c. for a control.

In order to decide which part of the gastric contents belongs to the bouillon and which to the gastric juice, he adds the salt which is not absorbed by the stomach. If one knows the percentage of this salt in the bouillon and in the extractum, one can calculate the absolute amount of gastric juice. For instance, if the gastric contents contains half as much salt as the control bouillon, of 100 c.c. contents, 50 c.c. are juice and 50 c.c. bouillon.

For details as to the calculation of the acidity, etc., the reader is referred to the original article.

With this test meal, Mintz made the interesting discovery that the stomach preserves automatically a certain acidity, and that when the acidity begins to exceed a stated degree, certain means of controlling it are called into play, notably the bile, whose function it is

to neutralize the excessive acidity. The presence of bile is not accidental, as it occurs only when the acidity becomes excessive.

Goodall¹ gives a technique for testing for bile in the gastric contents which is based upon the oxidation of bilirubin with nitric acid, forming green biliverdin. Half a test-tube of the fluid portion of the stomach content is taken. If this amount cannot be obtained, or if the contents consist largely of solid material, it should be diluted with water, thoroughly mixed, and the fluid portion poured off and filtered. The fluid is then saturated by shaking one or two minutes with ammonium sulphate crystals, or crystals which have been ground into a fine powder. About one inch in the bottom of the test-tube is usually sufficient. From 1 to 3 c.c. of acetone are added, and the whole thoroughly mixed by inverting the test-tube five or six times. It is best not to shake. After standing a minute or two, the acetone rises to the surface, carrying bile pigment with it. A drop of nitric acid is allowed to run down the side of the test-tube and the green reaction occurs in the acetone layer.

Laboulais and Goiffon² describe a modification of Mathieu-Rémond's method for determining the total volume of gastric juice. The work was done in the laboratory of Mathieu, and bearing the mark of approval of the latter, seems worthy of a review. The original method of Mathieu-Rémond is briefly as follows: After the extraction of a small portion of gastric juice (v), a known quantity of distilled water (q) is poured into the stomach and thoroughly mixed with the remaining contents. The acidity of the gastric juice extracted previous to the addition of water, and the acidity of the water mixture are both determined. If V represents the volume of the sample of contents, a its acidity, and a' the acidity of the mixture, then the following formula can be obtained in which x equals the quantity of liquid contained in the stomach after extraction of portion v .

$$\begin{aligned} ax &= a'x + a'q \\ \text{or } x &= \frac{a'q}{a-a'} \end{aligned}$$

The total volume of the stomach V , including the sample v , is thus:

$$V = v + \frac{a'q}{a-a'}$$

This method of Mathieu-Rémond presupposes two essential conditions:

1. The mixture of water and chyme must be homogeneous.
2. The residual chyme and that already extracted must be of the same composition.

¹ Boston Medical Journal, May 28, 1912, p. 487.

² Archiv f. Verdauungskrankheiten, vol. xvii, p. 421.

The first condition is met, but the second, as we have learned from the work of Gruetzner (quoted above), is not so easy of fulfilment, as the contents after a test meal are not homogeneous.

Laboulais and Goiffon, instead of diluting the gastric contents with water, use a titrated solution of di-sodium phosphate, 1 gram to 100 c.c. They extract as much of the contents as possible, then introduce through the tube 200 c.c. of the solution. Their calculation is as follows:

X = volume to be determined.

V = volume of sodium phosphate added, strength 1000.

$V + X$ are represented by $\frac{n'}{1000}$, then

$$\frac{Vn}{1000} = V + X \frac{n'}{1000} \text{ or } X = V \frac{(n-n')}{n'}$$

Or, to express it in another equation,

$$\frac{n}{n'} = \frac{X}{V} \text{ or } X = \frac{Vn}{n'} - V.$$

Example: One extracts 125 c.c. of contents, leaving in the stomach an unknown amount to be determined, 200 c.c. of phosphate solution are added ($\frac{1}{1000}$). After mixing thoroughly in the stomach, a small portion is extracted and titrated for phosphate. Suppose the result is 0.80 gram per thousand.

$$X = 200 \frac{(1-0.80)}{0.80} = 50 \text{ c.c.}$$

Or,

$$X = \frac{200 \times 1}{0.80} - 200 = 50 \text{ c.c.}$$

The method is an improvement on the former procedures, as it is exact, despite the small volume and composition of the gastric contents. It can also be performed without the usual test meal, and the authors claim that results can be obtained in fifteen minutes.

Somewhat along the same lines is an article by Fujinami,¹ in which an attempt is made to diagnosticate the presence of juice in the fasting stomach. (Reichmann's Disease, Parasecretion.) The method consists, briefly, in giving the patient two capsules, one filled with bismuth and the other filled with air. In the presence of gastric juice, the capsules are seen close together in the lowest part of the stomach, but when there is secretion, the air-filled capsule floats, while the other sinks, thus making an appreciable distance between the two.

Schlesinger² makes an astonishing proposition to use the *x*-ray for diagnosticating the acidity of the gastric juice. He gives the patient a

¹ Deutsch. med. Woch., 1912, p. 496.

² Ibid., 1911, p. 1391.

bismuth meal, and, after taking an exposure, waits an hour. At the end of this time, he has the patient drink a sodium bicarbonate solution, 3.0 grams in 40 c.c. of water, warning him not to belch (!). In two minutes a second picture is taken. The difference between the gas bubble in the first picture and that in the second, permits one to calculate the acidity.

This seems to me to be an unnecessarily complicated method for results which can so easily be obtained by simple means. Five years previously a somewhat similar method was devised by Schwartz,¹ and seems to have met with some success, contrary to Schlesinger's statement.

A warning note is sounded by Niden² in the use of carbonic acid gas for x-ray purposes, and he says that it should never be used on account of its danger, and because of the inexact results obtained. This warning should be heeded, for Behrend,³ in 1903, reported 3 fatal cases after 3 grams of tartaric acid and sodium bicarbonate. One case died of hemorrhage from an ulcer, the other two from shock. Two alarming cases are on record by Bardachzi,⁴ and Niden adds a case of severe hemorrhage. All the patients were past middle life, as far as can be gathered from the abstracts given in Niden's article.

Stiller,⁵ in his turn, attacks Niden for unnecessarily crying "wolf," and he says Niden used inflation in cases in which he (Stiller) would never have thought of using it. *Chacun à son gout!*

A champion for the defence of the stomach tube has arisen in Henius,⁶ but his article contains naught of novelty, except it be the fact that he regards his article as called for in this enlightened age of gastric diagnosis.

PEPSIN IN URINE. It may be recalled that Scholtz,⁷ in collaboration with Ellinger, reported the results obtained in 66 cases of achylia gastrica and carcinoma of the stomach. Their conclusions briefly put were, that in uncomplicated cases of achylia there is an absence of pepsin from the urine and gastric juice, while in carcinoma there is more or less urinary pepsin with gastric apepsia. This observation is suggested as an important diagnostic sign between the two conditions.

Their work was sharply criticised by Takeda, and it is as a reply to him that this article is published by Scholz.⁸ There is but little new in this, and the author but reiterates his claim that if in doubtful cases there is normal or increased urinary pepsin, with absence of gastric pepsin,

¹ Zeitsch. f. ärztliche Fortbildung, 1906, No. 12; Röntgenkongress, 1907.

² Deutsch. med. Woch., 1912, p. 1515.

³ Medical News, 1903, lxxxiii, No. 25.

⁴ Münch. med. Woch., 1911, No. 12.

⁵ Deutsch. med. Woch., 1911, p. 1982.

⁶ Ibid., 1912, p. 501

⁷ Deutsch. Archiv f. klin. Med., 1910, xcix.

⁸ Deutsch. med. Woch., 1911, p. 1303.

and if this result is obtained after using bouillon in place of tea, that case is to be regarded as malignant.

Strauss,¹ in a critical review of the work done, both by men in his laboratory and by others, expresses the opinion that the elimination of pepsin depends upon factors other than the purely local gastric condition. He cites the research of Rosenthal² as showing that in nephritis the permeability of the kidneys for pepsin and diastase is lessened, and he urges that this phenomenon must be taken into consideration. He even goes so far as to suggest that the estimation of urinary pepsin may be used in the diagnosis of renal function in the same way as diastase by Wohlgemuth. The opinion gathered from the review of Strauss' work is that he places very little credence in the assistance to be expected from the ferment in urine in gastric diagnosis.

I was interested in this subject, and undertook some estimations of the urinary pepsin and diastase in the laboratory of my late lamented chief, Dr. John H. Musser.³ I was impressed with the sources of error in the methods, and finally became convinced that no diagnostic aid at the present time is to be sought in the amount of pepsin or diastase in the urine. I found high pepsin figures in both achylia and nephritis.

ESTIMATION OF ALBUMIN IN GASTRIC CONTENTS. Although a review of Thiele's⁴ work might well be placed under gastric diseases, still, while discussing achylia gastrica and the difficulty of diagnosing it, it may be mentioned here. This is but a continuation of the work done by Wolff and Junghaus⁵ on the quantitative estimation of albumin in the gastric juice. These authors used a solution of phosphotungstic acid made as follows:

Phosphotungstic acid	0.3
Acid hydrochlor., pure	1.0
Alcohol, 95 per cent.	20.0
Aq. dest.	q. s. ad. 200.0

The gastric juice is diluted with distilled water in the following proportions: 1 to 10, 0.5 to 10, 0.25 to 10, 0.1 to 10, 0.05 to 10, and 0.0 to 25 with 1 c.c. of the reagent, and the amount of albumin is read off from that tube which shows no cloud. The result expressed in albumin amounts of 10, 20, 40, 100, 200, and 400. Thiele is conservative in his estimation of the value of the method, although his tables show striking figures. In the cases of benign achylia, the values were between 30 and 40, in one case rising to 100, while in carcinoma, they lay between 100 and 400, the average being 200. He timidly suggests that when there is an albumin value of 100, one may expect a beginning carcinoma, while in advanced cases 200 and 400 are found. Just how early one can diagnose the condition he does not say.

¹ Deutsch. med. Woch., 1912, p. 163.

² Ibid., 1911, No. 20.

³ New York Medical Journal, April 22, 1911.

⁴ Berl. klin. Woch., 1912, p. 544.

⁵ Ibid., 1911, No. 22.

1. Albumin values below 60—achylia.
2. Albumin values of 100—carcinoma.
3. Albumin values of 100—borderline cases (speaks more for cancer than for achylia).

There is no mention here of the values obtained in health. (See PROGRESSIVE MEDICINE, December, 1911, p. 40.)

Einstein¹ publishes an account of work along similar lines with about the same conclusions as Thiele.

EXCRETION OF DEXTROSE IN THE STOMACH. Perhaps more appropriate to another department of PROGRESSIVE MEDICINE, but not entirely irrelevant in this, is an abstract of an article by Kleiner² on the elimination of dextrose from the blood into the gastro-intestinal canal. It has always been an interesting question whether in diabetes mellitus, where there is always hyperglycemia, there is an excretion of dextrose in the alimentary tract. Some, as Fischer and Moore, believe there is none, MacCallum claiming there is. The conclusions of Kleiner are interesting. Even in a carbohydrate-poor diet, dextrose was found in the contents of the stomach and small intestines, while after an intravenous injection of glucose there is a marked increase, although the latter is insignificant in comparison to the urinary dextrose.

OCCULT BLOOD. There are still observers who believe there may be some clinicians who are unfamiliar with the significance of occult blood in the gastric contents and the feces. Among the former is Zoeppritz.³ It seems strange to us that in this day of grace we must still be told that the diet must be meat-free, that hemorrhoids and injuries to the mucous membrane must be excluded as a possible source of blood before an opinion regarding the test in the excrement is offered. The article smacks of the primer and the conclusions of our author, although intended for practising physicians, are generally made the property of our third year students. He says that while occult blood appears in the gastric contents occasionally, as a result of vomiting or injury caused by the tube, such a source of error is insignificant. Occult blood is the most important of the non-specific (?) symptoms of gastric carcinoma and appears early, while negative findings speak always against cancer.

LIPASE. Davidsohn⁴ describes a quantitative method for the determination of lipase. The clinical significance is not entered into by the author.

A study of the gastric contents in gastropptosis leads Brown⁵ to conclude that in the majority of cases there is a distinct diminution in the amount of the free hydrochloric acid, this diminution running *pari*

¹ Med. Klin., 1912, No. 12, p. 484.

² Journal of Experimental Medicine, 1911, xiv, p. 274.

³ Mitteilungen a. d. Grenzgebieten der Medizin und Chirurgie, 1912, xxiv, p. 538.

⁴ Berlin. klin. Woch., 1912, p. 1132.

⁵ New York Medical Journal, 1911, xciv, p. 571.

passu with the degree of ptosis. The writer suggests that gastropptosis, therefore, may be one of the causes of achylia.

FUNCTIONS OF THE STOMACH; THEIR DISTURBANCE AND RECOGNITION. Austin¹ rightly says that if food is found in the stomach twelve hours after the evening meal it is almost diagnostic of a narrowed pylorus, but the absence of food does not, by any means, exclude the possibility of impaired motility of a minor degree. Lesser degrees of retention must have some significance, and Austin believes, with Riegel, that when the free hydrochloric acid factor is small in proportion to the total acidity it is evidence there exists an impairment of the motility of the stomach, since the longer the food remains in contact with the gastric juice, the more of the acid will be bound by the protein and the less will appear free. As a supplement to this rule, however, there must be little or no organic acids.

The technique of Austin's investigation is to give at night a meal of meat, bread, and potato, with rice pudding containing raisins for dessert. Nothing else is taken before bedtime, and the next morning, at nine o'clock, the stomach is washed out thoroughly and the usual Ewald meal given and extracted in an hour. The free acid was determined by Congo paper, and Günzburg's reagent, and the total acidity by phenolphthalein. In the fasting stomach, the first washing (a half-liter) was kept apart from the subsequent washings, and was usually found to contain the major part of the residue, if any was present. By its small volume, it greatly facilitated the subsequent sedimentation and centrifugation for microscopic examination, when by gross appearances alone the nature of the residue could not be determined at a glance.

Fifteen cases were studied in this way, and it was found that whenever macroscopic or microscopic food rests were discovered in the fasting stomach, the total acidity after the test meal was 60. There was not a constant ratio between the free and the total acid factor, and therefore a hyperacidity is the best index of impaired motility, and not the proportion which the free hydrochloric acid bears to it.

Borgbjärg's² experience with the Riegel meal has not been satisfactory, and he recommends the test meal of Bourget-Faber as far preferable in the study of disturbances of motility. This meal consists of 250 c.c. of oat-meal porridge, 50 grams of boiled and finely chopped beef, two slices (50 grams) of white bread with butter, 8 stewed prunes, and a teaspoonful of cranberry compote. This is given in the morning on a fasting stomach, and five hours after eating (five and a quarter hours after beginning the meal) the stomach is washed out. If there are food rests in the wash water, the next day lavage is practised at the end of six hours, and so forth, until no food particles are regained.

¹ Medical Record, 1912, p. 1085.

² Deutsch. med. Woch., 1912, p. 452.

There should be none found in the normal stomach after five hours, or rather, there should not be any large portions of food; small pieces of prunes or a few cranberry skins are often met with, and do not indicate any insufficiency. Often this condition is spoken of as "little retention" (Madsen). The inferences to be drawn from the various degrees of retention are given by Borgbjärg.

The twelve-hour retention, or what he terms "continual" retention, occurs principally in cases of pyloric stenosis on the basis of ulcer or cancer. Pyloric spasm, without stenosis, is often a cause, and cancer not situated at the pylorus may give rise to retention, although this is always a late finding. Cholelithiasis is sometimes associated with this form of retention, but Borgbjärg is skeptical about chronic gastritis being an etiological factor.

The diagnostic importance of a six-hour retention is questionable, but, as a rule, there is a true organic lesion present, as cancer, ulcer, or gastritis. Cases which are not true organic disease of the stomach have this retention, however, as witness gastropptosis, dyspepsia, gallstones, and intestinal diseases. (I would call attention to an abstract of Borgbjärg's article on the influence of intestinal diseases on gastric motility. (See under Intestinal Diseases.)

As regards the retention after five hours, the same applies here as was said for the six hour form, only this type is found more frequently in individuals who have no sign of organic disease. Congenital asthenia (Stiller) is a prime cause of this variety of retention.

Practically speaking, the so-called "little" retention is of importance only after twelve hours, and is always a sign of ulcer, carcinoma, or achylia gastrica. Dyspepsia, unassociated with organic disease, and intestinal conditions are also causes. This form of retention is probably due to changes in the mucous membrane, which makes the expulsion of food from the stomach difficult of accomplishment.

As far as treatment is concerned, the twelve-hour retention generally points to organic stenosis, and, in these cases, operation is indicated. The five or six hour retention is never an operative index, although, of course, the disease causing it may be such that operative treatment is absolutely indicated.

Boas¹ is not in favor of the Bouget-Faber test meal, and prefers to hold to the Leube dinner, although he admits that it is often impossible for a patient with no appetite to take it. He recommends the use of chlorophyll solution, 20 drops in 400 c.c. of water, which he gives in a green-tinted glass, on a fasting stomach. In order to test the amount of chlorophyll solution left in the stomach, he makes a stock solution of 1 to 400, which he then dilutes to 0.5, 0.3, 0.2, 0.1, 0.5. After thirty minutes the fluid is expressed, as nominally all the water is expelled in this time, with the exception of 50 to 60 c.c. The stomach is then

¹ Deutsch. med. Woch., 1912, p. 455.

washed with 400 c.c. minus x and this is combined with the residue x . As wash water he uses 1 per cent. sodium carbonate solution. The total wash water is then filtered and compared with the test solution. If, for instance, the wash water was the same color as the chlorophyll solution 0.2, then 0.8 chlorophyll was left in the stomach, or, in other words, 80 per cent. of the solution has been expelled.

Normally only 5 to 10 per cent. of the solution is retained, and those cases where no green fluid is obtained after thirty minutes, he calls hypermotility. In the severest forms of motor insufficiency, no fluid escapes in thirty minutes, and these are always to be considered as operative. In other instances, 200 to 300 c.c. are retained. These are milder forms of stenosis, and are amenable to a certain degree to medical treatment. As regards carcinoma, the amount of retention depends on the location of the tumor. Gastritis and achylia gastrica, also enteroptosis are accompanied by impaired motility. The results with ulcer are inconstant—some have delayed motility and some show normal motor function.

A new method of determining motility is described by Holzknecht and Fujinami,¹ who give the patient a heavy and a light capsule followed by 200 c.c. of water. (See previous pages.) The light capsule floats on the surface of the water, where, with the x -ray, it may be seen to dance when the abdominal wall is tapped, the heavy capsule sinks, and may be detected in the lowermost part of the stomach. If one examines through a screen every twenty or twenty-five minutes, the time may be determined when both capsules are seen together. Normally, both are seen low down in fifty-five minutes, but, under pathologic conditions, the time may be as short as ten minutes, or as long as an hour and a half. The time consumed by the stomach in expelling 200 grams of water is generally seventy minutes. This seems to be an ingenious method and one less unpleasant for the patient than the better known procedures, except for the time which must be given to it, by the subject and by the operator.

After discussing the ease with which surgical interference relieves motor insufficiency, Fricker² pleads for early recognition of the same, claiming that a diagnosis can be made by any doctor, and that such a diagnosis is not dependent on special laboratories. Normally, as is well known, the stomach in the morning is completely empty, or at the most, contains but a few centimeters of fluid (gastric juice, saliva), or, in other words, at least once in twenty-four hours the stomach is absolutely empty. Not only is all the food expelled, but also the microorganisms, so that we can say with certainty there is motor insufficiency when the stomach, after twelve hours' rest, contains microscopic food rests. Whether microscopic remains indicate insufficiency, Fricker

¹ Münch. med. Woch., 1912, p. 345.

² Corresp.-Blatt f. Schweizer Aerzte, 1912, p. 441.

declines to say, as "the subject is still too new to form a definite opinion," but he does say that in his own experience no, or but very few, particles are seen in health. Never, he insists, should one find sarcinæ or Oppler-Boas bacilli, and should these be present, even in the absence of macroscopic food rests, the condition is undoubtedly one of insufficiency. Furthermore, not only is there motor insufficiency, but there is alteration of the chemistry as well. He describes the method of examination which is so familiar to readers of PROGRESSIVE MEDICINE that it needs no repetition here.

Regarding the treatment of motor insufficiency, he advises medical treatment for the milder cases, and also for the chronic form, provided the latter is not malignant. Should small food particles be retained, and should there be undue fermentation, with its consequent irritation of the gastric mucosa, Fricker recommends operation.

Bamberger¹ distinguishes between food rests obtained in the fasting stomach and food rests obtained after *lavage* of the fasting stomach. He thinks it incumbent upon him to manufacture new terms, which is a great pity. "Minimal retention" means the recognition of small amounts of macroscopic or microscopic food rests in the fasting stomach. He subdivides this into "minimal macroretention and minimal microretention." The former means when the fasting stomach or the wash water contains microscopic particles. "Minimal microretention" is a term used to express the condition when the food particles cannot be recognized as such by the naked eye, but are detected only by the use of the microscope. The author claims that the normal stomach empties itself so thoroughly that there are no macroscopic food rests to be seen.

"Macroretention" is always pathological, and is seen especially in ulcerations and in hypersecretion unaccompanied by any disturbance of motility. Bamberger emphasizes, however, that it is of value as a sign of ulcer only when taken in connection with other signs.

"Microretention" is of lesser importance, as it is seen in health.

Schüle² makes a distinction in the nomenclature of motor insufficiency by calling that condition "relative insufficiency" where the organ is not able, under all circumstances, to perform its function. He recalls the so-called reserve force of the heart by means of which it is enabled to functionate under conditions far exceeding the normal.

A very good paper, calling attention to the value of a careful history and rigid physical examination in functional gastric diseases is that of Galambos.³ It lends itself illy to a review, and I regret that it cannot find more than passing mention in this section.

¹ Arch. f. Verdauungskrankheiten, 1911, xvii, p. 241.

² Med. Klin., 1912, p. 429.

³ Archiv f. Verdauungskrankheiten, 1911, xvii, p. 395.

Grekow¹ describes an unusual condition of motor insufficiency of the stomach, secondary to perigastritis of gonorrheal origin. The chief characteristics of this seems to be: Severe grade of motor insufficiency, with hypertrophy of the pylorus; adhesions in the region of the pylorus, ligamentum hepatoduodenale, and gall-bladder; and absence of history pointing to ulcer. Associated with this is inflammation of the tubes and pelvic organs. An absolute requirement for this form of motor insufficiency Grekow insists on a weakened condition of the patient caused by a very severe gonorrheal infection.

CAN THE STOMACH COMMINUTE FOOD? The question whether the stomach is able to comminute food is taken up by Arnold.² By giving to patients silver wire in the form of balls, and paraffin rings of various melting points, and studying the alteration in form they suffered in passing through the gastric intestinal tract, he concludes that while there is a certain amount of pressure in the stomach, the organ is absolutely unable to break up food such as vegetables, etc., by mechanical means alone, the principal factor being the gastric juice.

EFFECT OF IRREGULAR MEALS. In a very neat experimental study, Kuelbs³ was able to show that irregular meals and overloading of the stomach produced serious results and even death in cats. Even regular meals, but at long intervals, caused rapid loss of weight and atony of the stomach. He offers these studies as a parallel to the daily observation in man, that the human stomach, when food is taken regularly, is able to stand considerable use and abuse, but that when the food intake is at irregular intervals, gastric disturbances soon ensue. I am reminded, in this connection, of a remark which my late esteemed chief, Dr. Musser, was wont to make: "One can undergo physical fatigue, mental worry, and sleepless nights and be little the worse off, but irregular meals soon play havoc with digestion, and impair a man's health more quickly than anything."

LENGTH OF TIME FOOD REMAINS IN THE STOMACH. The practical importance of Wulach's⁴ studies on the length of time proteins, carbohydrates, and fats remain in the stomach is to be seen in the therapeutic application of his results. In hyperacidity, the object is not so much to combine the hydrochloric acid as it is to increase the length of time the food remains in the stomach. This is best accomplished by fatty food, which Wulach showed remained in the stomach the greatest length of time. In motor insufficiency, in gastroparesis, and in gastrectasia, the stomach should be taxed as little as possible, and he recommends carbohydrate food with little fat. In the so-called "Mastkuren," where the object is to fatten the patient, practically no fat

¹ Zentralbl. f. Chirurgie, 1912, p. 105.

² Zentralbl. f. inn. Med., 1912, p. 77.

³ Zeitsch. f. klin. Med., 1911, lxxiii, p. 47.

⁴ Münch. med. Woch., 1911, p. 2319.

should be used, and the carbohydrates should be increased. By so doing the stomach empties itself rapidly, appetite is renewed more frequently, and the subject can eat more than would be the case if fat, which remains so long in the stomach, was given. The opposite is also true, and this will seem paradoxical: In obesity cures, the object is to have food remain a long while in the stomach, thus doing away with the sense of hunger, so that the patient will take less food. Therefore a diet rich in fat should be prescribed.

X-ray Studies on the Mechanism of the Stomach. Sick,¹ working with the fluoroscope and with plates, publishes an extremely long but interesting article. The beginning of peristaltic waves, he says, varies in perfectly normal stomachs, and, also, the periodicity is not regular, although he emphasizes that the stomach contracts in no *irregular* manner, there being a certain amount of rhythmicity in the contractions (every twenty to thirty seconds). A stomach, which has pauses of a minute, is always to be regarded as pathological. When peristalsis is quiet, there are no, or but faint, depressions at the fundus, contractions being seen only at the antrum pylori. This variety is generally seen in women and in gastroparesis, although one must not conclude that it is an indication of deficient motor power, as it is seen in the opposite condition. There are no peristaltic waves to be seen on the lesser curvature.

The more powerful contractions are seen in health, in dyspepsia nervosa, and in beginning pyloric stenosis. The peristaltic waves begin in the cardiac end of the stomach, where they appear as circular depressions, and progress to the antrum completely segmenting the bismuth meal in their march. The waves appear regularly at intervals of from twenty to thirty seconds, and there are no subjective symptoms; at the most, slight pain. These powerful contractions approach the pathological, for in some instances there is a depression which lasts a certain length of time and then passes away (fatigue signs "Ermüdungs oder Absterbeerscheinungen"). Sick found these fatigue signs in patients suffering with functional or organic nerve lesions (tabes, hysteria, etc.).

Although there is such a wide range to those cases which might be classified as normal, still Sick has been able to draw some connection between the fluoroscopic examination and certain gastric diseases. The functional conditions are generally associated with these strong peristaltic waves, although there is no increase in the emptying powers of the stomach. In cases of hypersecretion, even as early as twenty minutes after the bismuth meal, one is able to see two different shadows, one that of the bismuth, and the other, that of the secretion.

Organic diseases of the stomach are detected by change in form and position of the stomach, by change in the peristalsis and by the way the stomach empties itself and in what time. Sick lays great emphasis

¹ Med. Klin., 1912, pp. 682 and 732.

on the function of the Auerbach plexus, injury of which, he claims, causes interference with the muscular action of the stomach. Gastric ulcer, as is well known, shows nothing on *x*-ray examination which is at all typical, that is, so long as the ulcer is more or less superficial, but when the innermost muscle layer of the stomach is ulcerated and the decided contractions of the stomach are seen (hour-glass stomach) adhesions can be expected from the *x*-ray picture, but there is nothing typical.

Acute gastritis is recognized by the arrhythmical contraction, by a peculiar uniform dilatation of the stomach, and by increase in the amount of gastric juice. The cause of these signs he does not care definitely to state, but he believes the underlying factor is irritation of the nervous mechanism giving rise to "*Ermüdungserscheinungen*." In discussing the latter more fully, he says, they comprise all disturbance of gastric motility, which in any way interferes with the expulsion of food from the stomach. They are shown in the *x*-ray picture as abnormalities of position and of peristalsis. The cause of the fatigue signs can be sought primarily in disturbances of the muscular tissue or in disturbances of innervation, or the phenomena can be produced as a result of mechanical hindrance to the expulsion of chyme. The forms which the fatigue signs assume may be varied, and may appear as abnormalities in the shape of the stomach, the position, and the peristalsis. The latter may be absent altogether, or lessened, or even increased. Sick believes that early atony of the stomach, the recognition of which escapes the usual clinical methods, can be detected by means of the *x*-rays. The latter discloses dilatation of the fundus of the stomach, with the lesser and greater curvature representing vertical parallel lines. As the disease progresses, greater dilatation of the stomach is observed.

The author then discusses the diagnosis of pyloric stenosis and other organic diseases of the stomach, but, as this part of his paper is more or less a repetition of what is generally known, I have not abstracted it. Just how valuable and reliable Sick's article really is, is questionable, but the work is based on many examinations and on good clinical notes, and is accompanied by twenty cuts, so that his reasoning and conclusions are readily followed. The internist often stands aghast at what the Röntgenologist sees in his plates, and the opinion he expresses on misty and vapory shadows, so that often he believes that the latter brings "*Fantasie und guten Willen dazu*," both of which valuable aids being denied the internist.

A somewhat similar, though much shorter, article is by Schicker.¹

Satterlee and Lewald² gives the following times when the various portions of the gastro-intestinal tract empty themselves after a meal. Food begins to enter the small intestine immediately, and by the end

¹ *Deutsch. Arch. f. klin. Med.*, 1911, civ, p. 566.

² *Journal of American Medical Association*, 1911, lvii, p. 1255.

of an hour at least, one-fourth is in the jejunum. The stomach is emptied of 500 c.c. of milk or soup in two and one-half to four hours. This passes to the cecum in two hours, and the complete emptying time of the small intestine is probably six hours. The paper includes consideration of normal subjects, and of those with splanchnoptosis with or without intestinal symptoms. The authors state that there is no ptosis if the lower border of the stomach is well above the umbilicus. The shape of the stomach varies according to the position assumed by the patient; when he stands, the long axis is vertical, and when he is recumbent, it may be oblique or almost transverse.

In order that the size, shape, and position of the stomach be recognized, several plates should be made a few minutes after the ingestion of the bismuth meal, and they think organic constrictions can be distinguished from peristaltic waves better by plates than by the fluoroscope. The cardiac end empties rapidly, and in cases of gastric fermentation fills up quickly with gas. The gastric motility is more rapid during the early part of digestion, and some stomachs seem to rest after the first thirty or sixty minutes, at which time they contain about one-fourth of the original amount of food. The end motility of a stomach is not influenced by free hydrochloric acid, although hyperchlorhydria augments the early activity.

The duodenum empties itself too quickly to permit of accurate study. Portions of the duodenum can be identified by a small mass of bismuth "bishop's cap" separated from the pyloric antrum by the outline of the pyloric muscle. Bismuth appears in the jejunum in a few minutes. It is rare to find no bismuth in the small intestine in ten minutes.

In the jejunum, the course of the bismuth is first to the left iliac region, but it quickly settles in the medial line. In non-ptosed conditions, it appears between the umbilicus and brim of the true pelvis, and in the true pelvis in ptosis.

Bismuth reaches the ileocecal valve in about two hours. Complete emptying in six hours. The normal cecum is situated well above the brim of the true pelvis. When the colon is ptosed the cecum lies near the brim and, in severe cases, often hangs over into the true pelvic cavity.

The authors claim to see the appendix filled with bismuth, and, in one case, bismuth remained four days. They show an interesting picture of an appendix on the left side of a patient who had complained of pain in McBurney's point, and who was supposed to have appendicitis.

The authors have adopted a classification for size, and shape of colons.

Ptosis of the colon is recognized by low position of caput coli and of the hepatic flexure, which is normally at or above the level of the umbilicus. Motility of a ptosed colon is always slow.

The sigmoid is variable as to length and size. Normally it is situated well within the pelvic brim and does not pass much to the right of the median line.

POSITION AND SHAPE OF THE STOMACH. We have been led to believe, through the researches of Rieder, Holzknecht, Groedel, Cerné and Delaforge, Leven and Barret, that there is now no doubt about the normal position of the normal stomach, that is, that most of the latter is contained in the left hypochondrium, with the pylorus at about the level of the umbilicus. Talma¹ asserts that (contrary to the opinion of Röntgenologists), after the bismuth meal only one part of the stomach, namely, to the left of the vertebral column, is filled. A portion to the right of the latter remains invisible, and the pylorus is located under the liver about in the para sternal line.

In order to demonstrate this, he says that bismuth is inferior to air, and the patient must be examined in the vertical position and in the dorsal position successively, all pressure on the abdomen being avoided. According to the amount of air introduced, the stomach will be seen extending little by little to the right of the vertebral column, until, finally, the pylorus appears below the liver in the right parasternal line.

This is such a radical departure from what we have been taught that no comment, which possesses any value, can be made on it. It will be most interesting to note what effect this communication of Talma will have on the Röntgenologists who have been basing their opinion on the bismuth picture.

Shape of the Stomach. Groedel,² in conjunction with Seyberth, defends himself against Stiller's criticism of the form of the stomach as described by Groedel, by offering proof in dogs, that the siphon form (Groedel) of the stomach is not, as Stiller believes, a peculiar contraction form of the stomach due to the specific action of bismuth, but is the natural form, as he (Groedel) held, many years ago.

Gastroscopic Examination. A method of gastric examination by means of a new gastroscope, invented by Loenning-Stieda and modified by Mouré,³ is described by the latter. The examination may be done without using a general anesthetic, local anesthesia being produced by touching the throat with cocaine. Many sketches, which are somewhat startling in their realism, depict the instrument and its use. The author, while acknowledging the difficulty of the method, and the discomfort to the patient, urged its use as a valuable addition to our diagnostic armamentarium. The method seems to be in advance of anything yet described, and the writer's delineation of it is well worded. Whether it will ever become popular with the profession remains a question.

¹ Archives des Mal. de l'App. Dig., 1911, v, p. 594.

² Archiv f. Verdauungskrankheiten, 1912, xviii, p. 8.

³ La Presse Méd., 1912, x, p. 101.

Gastric Secretion. LARVAL HYPERACIDITY. Friedenwald¹ calls attention to the fact, which all of us have appreciated, namely, that certain patients consult us for symptoms which we are often pleased, *ex cathedra*, to pronounce as referable to a hyperchlorhydria. Our "amour propre" suffers slightly when a gastric analysis reveals, not only no increase in the free HCl but often hypochlorhydria and even an acidity. This phenomenon has been explained on the basis of hyperesthesia, but the more reasonable view seems to be that there is true hyperacidity, which is not revealed because the gastric contents are examined an hour after ingestion of the meal. It is supposed that the gastric juice is made up of two components, an inactive diluting fluid and an active form whose specific action is to digest proteids. The active digestive secretion is gradually diluted by the diluting fluid, and it is conceivable how, if the latter be secreted rapidly, a gastric juice which is hyperacid when first secreted may be rapidly reduced to normal or subnormal.

Schüler first described the condition, giving to it the name "hyperaciditas larvata," in contradistinction to the usual form which bears the title "hyperaciditas manifesta." Schüler thinks there is true hyperacidity at an early period of digestion, but that the secretion becomes gradually neutralized, so that at the end of an hour it will present a normal or diminished amount of acid. Schüler's zeal in coining euphonious terms produces for this the name "secretio alta et celer."

Friedenwald reports 6 cases, 4 males and 2 females, whose ages varied between twenty-six and fifty-eight years. The symptoms complained of were pain and pressure in the stomach one hour after meals, lasting for one, or one and a half hours, and relieved by eating. Acid eructations, heartburn, nausea and vomiting are frequently seen, and, although the appetite is increased, there is dread of food on account of the pain. General nervous symptoms are encountered, such as headache, insomnia, lassitude, and depression.

The gastric contents can vary between 215 and 368 c.c., are watery, and contain but little sediment, although upon standing two layers are formed—a lower, slight in amount, but with solid sediment, and above, a clear layer, larger in quantity. Normally, the solid is to the liquid portion as 40 is to 60, but in larval hyperacidity it is as 22 is to 90. The specific gravity is lower than normal, the total acidity is always normal (38 to 56) and the free also (30 to 44). My personal feeling is, that these last figures should not be regarded as normal, and I should have no hesitancy whatsoever in pronouncing a case as one of hyperchlorhydria if figures about 30 are obtained.

The gastric contents were removed at intervals of fifteen, thirty, forty-five, sixty, seventy-five, and ninety minutes after the ingestion of an Ewald meal, and at thirty, sixty, ninety, one hundred and fifty,

¹ American Journal of American Science, 1911, cxlii, p. 157.

one hundred and eighty, two hundred and ten, two hundred and forty, and two hundred and seventy minutes after a Riegel test dinner. I have reproduced four diagrams from Friedenwald's paper which show a comparison of these results with the normal.

The diagnosis does not present any difficulty. The symptoms of hyperacidity which arise early in the period of digestion, together with the characteristic features of the gastric contents, the large amount obtained consisting usually of a watery secretion, with a low specific gravity, and with a normal acidity and presenting the amidulin reaction, distinguish these conditions from the normal forms of hyperchlorhydria. The absence of an epigastric painful area, as well as the absence of occult blood in the stools, distinguish it from gastric ulcer.

The treatment should be directed toward the nervous system. In emaciated individuals the best results are obtained by means of a systematic rest cure. The diet should consist of three meals a day, together with intermediate feedings of liquid food. The dietary should contain an excess of protein and fat, but a moderate quantity of carbohydrates. Milk, eggs, and fish are to be preferred.

Minami¹ studied the effect of anemia on dogs, producing that condition by subcutaneous injections of pyrocin (acetylphenylhydrazin) in doses of 8 c.c. of a 5 per cent. solution. The same phenomena were encountered experimentally as we meet with clinically, to wit, that there is no definite alteration of the gastric function in anemia. In chlorosis, for instance, we find sometimes a high acidity of the gastric juice and sometimes low figures, and this was Minami's experience in the experimental laboratory.

INFLUENCE OF HOT WEATHER ON THE SECRETING FUNCTION OF THE STOMACH. This article by Sallé² was prompted by the researches of Rietschel, Kathe and Liefmann, and Lindemann, which attempted to explain the problem of infant mortality during the summer season. The question is still open whether hot weather acts directly on the infant, or whether it exerts its injurious effects by changes wrought in food. Although this paper by Sallé, who is an assistant in Heubner's clinic, is intended directly to appeal to pediatricians, it contains material, based on animal experimentation, which should be the property of the internist as well.

His *modus operandi* was to institute a little stomach (Pawlow) in young dogs, and while under observation regarding the temperature and moisture of the air, the body weight, and body temperature, the gastric juice was examined in the usual way. The animal was then put in a cage (temperature 26° to 36°), which Rietschel says about corresponds to those houses where deaths are most frequent (Sommersterbehäuser). After studies were made under these condi-

¹ Virchow's Archiv., 1912, cviii, p. 13.

² Jahrb. f. Kinderheilk., 1911, lxxiv, p. 697.

tions, the dog was placed again in the open air, and then, finally, once more in the heated cage.

Sallé was able, by raising the temperature of the external air above a certain point, to produce, in young dogs, loss of weight, rise in body temperature, diarrhea, and vomiting. As regards the stomach, there was a diminution in the quantity of gastric juice, decrease in the digestive power, lowering of the total acidity, and of the free hydrochloric acid, and, finally, a total disappearance of it. In other words, the results obtained in the experimental laboratory showed a striking parallelism with the "summer complaint" of children. Sallé does not deny that alteration of milk under the influence of hot weather is also a factor in infant mortality, but it is of great interest to learn that heat of itself, the food supply remaining pure, can bring about gastrointestinal symptoms, which may be truthfully compared to those seen in infants.

INFLUENCE OF CERTAIN SALTS ON THE GASTRIC ACIDITY. Mathieu¹ reports some very astonishing and interesting observations after the administration of sodium bicarbonate and sodium citrate. He found, in the first place, that cases of hyperchlorhydria eliminated decreased amounts of chloride in the urine. When 10 grams of bicarbonate were given, the total chlorides increased, but when 20 grams were administered they fell considerably, and this seems to be due, not only to the retention of sodium, but also to a direct inhibition of the gastric juice. The paper is but a preliminary report and a second publication will be awaited with much interest and anticipation, as Mathieu makes thoughtful suggestions for a continuance of the work.

Floersheim² undertook some experiments to determine the influence upon HCl of sodium chloride when taken into the stomach by mouth, and when introduced into the rectum by proctolysis. Neither abstinence from salt nor its ingestion in great amounts made any difference in the hydrochloric acid content of the gastric juice. Floersheim, in the treatment of hyperchlorhydria, does not place any restriction on the salt intake.

In a paper allied to the above, Richartz³ takes up the question of the effect of salt abstinence on hypersecretion, and it may be noted in passing, that he uses this word synonymously with hyperchlorhydria, a liberty which will not be pardoned him by all. Nine cases were put on a salt-poor diet (3 grams being ingested with the food) with the result that there was a drop in the curve of gastric acidity, and also in the output of chlorides in the urine, both being accompaniments of improved subjective conditions in each patient.

Although I have not conducted any research other than loose clinical

¹ Archives des Maladies de l'Appareil Dig., 1911, v, p. 599.

² Medical Record, 1912, lxxxi, p. 1089.

³ Deutsch. med. Woch., 1912, p. 697.

observations, I can support the claims of Richartz as regards the value of salt-poor diet in the treatment of hyperchlorhydria. The regime is a little irksome at first, but patients quite soon become accustomed to it and feeling its benefit, are willing to persevere in its continuance. I have had numerous patients for whom I have prescribed this diet, and have had but few demurrals. The insipidity of the food can be decreased by using sodium bromide in place of salt.

Gastric Ulcer. PATHOGENESIS OF GASTRIC ULCER. Aschoff¹ believes that autodigestion of the mucous membrane plays no part in the production of ulcer, but that the principal mechanical moments are injury of the mucosa due to circulatory disturbances. These may be either spastic conditions of the arteries with secondary hyperemia and hemorrhage, or embolic infarcts of the mucous membrane; he is not decided to which must fall the lion's share in the etiology. Chemical and thermic traumatism also play a role, as does injection.

For the chronicity of the ulcer, long-continued contact with the raw surface by gastric juice, especially a hyperacid secretion, coupled with mechanical irritation are the most conducive.

EXPERIMENTAL GASTRIC ULCER. In 1899, von Eiselberg, having experienced 8 cases of hematemesis following operation, suggested that the hemorrhage was due to a thrombus in the omental veins, which, becoming detached, was thence carried to the gastric veins, where it caused a local thrombosis. The latter caused an area of necrosis, followed by ulceration and hemorrhage. Engelhardt and Neck, by ligating the omental vein, were able to produce punctiform hemorrhages in the stomachs of lower animals. These suggestions, and the newer observation of the association between appendicitis and ulcers of the stomach of the duodenum, led Wilkie² to investigate these questions: (1) Whether the veins of the omentum are particularly susceptible to thrombosis; (2) if this is the case, whether there is any disposition on the part of the thrombus to become detached and to enter the portal circulation, and (3) is it probable or possible for such a thrombus to travel to a vein of the stomach or duodenum and there cause an ulceration?

Injury of the omentum was produced by rubbing with gauze, by cold and by heat, the animals being killed at intervals from two to four days. All three measures were followed by thrombosis, the latter being produced immediately after the application of cold or heat. Later, hemorrhagic infarcts were found in several portal vessels, and Wilkie regards these as embolic. As a proof of the validity of this view, he caused a septic thrombosis of the omentum, which was followed by several septic infarcts in the liver.

The possibility of retrograde embolism of the gastric veins was then taken up. Wilkie injected sterile oil into the omental vein, and was

¹ Deutsch. med. Woch., 1912, p. 494.

² Archives gén. de chir., 1911, vii, p. 1081.

able visually to follow its course through the veins of the stomach and even to the spleen.

Whether the gastric lesions can be produced by embolism of the omental vein was studied by injecting thrombokinase into several veins of the omentum, with negative results. Animal charcoal was then used, and typical ulcerations were produced, together with changes in the liver and spleen.

Occasional ulcers of the duodenum were observed.

This work of Wilkie seems to be conclusive, and he makes an appeal by its directness and lucidity of style. Just how valuable his findings will eventually be found to be, cannot be conjectured, as the large number of papers purposing to throw light on the pathogenesis of gastric ulcer have lost their luster, and are not intrinsically luminous enough to send even a gleam from their own obscurity.

ANATOMY OF GASTRIC ULCER. The teaching of Cruveilhier that ulceration and ulcers of the stomach represent but different steps in the same condition, has had a marked influence on the conceptions of more modern investigators. Cruveilhier divided the various stages as follows:

First degree: Ulcerations limited to the mucosa (follicular erosions).

Second degree: Destruction of the fibrous layer.

Third degree: Destruction of the muscular coat.

Fourth degree: Destruction of the serosa, perforation.

Hayem,¹ in accordance with the more recent views, does not believe that erosions (ulcerations) and ulcers, mark but steps in one process, but that they are evidences of two distinct phenomena. In erosion, the principal change is a cone-shaped area of necrosis, whose apex points from the submucosa toward the muscularis, where it stops. There is dilatation of bloodvessels and lymph spaces in this cone and around it. In addition to venous stasis, there is hyaline degeneration of the walls of the veins and arteries. Through interference to the circulation, edema and sometimes rupture of the capillaries are seen. When the lesion is very small, there is no effort to form scar tissue, but when larger, there is intense lymphoid infiltration.

In the majority of cases there is no ulceration of the arteries, although this may occur. Dieulafoy designates this latter form as *exulceratio simplex*, the features being loss of substance of the gastric mucosa, either circular, elliptical, or star-shaped, of various sizes. The edges are not depressed or bloody, the base of the ulcer is red, and there may be seen with the naked eye a lesion of the artery and of the mucosa, and sometimes of the muscularis. This finding is of interest from the clinical side, as it explains the massive hemorrhages which are rarely seen in *gastric ulcer*. The mucosa shows evidences of chronic gastritis,

¹ Archives d. Maladies de l'Appareil. Dig., 1911, v, p. 349.

although there is no apparent relation between the kind of gastritis and the erosion.

After the reading of Hayem's article, it would seem that lesions of the mucous membrane of the stomach can be legitimately divided into erosions and ulcers, the former comprising necroses of the stomach caused by various agents independently of the chemistry of the organ. They can be, and should be, sharply differentiated from the true ulcer (round ulcer, perforating ulcer, peptic ulcer), by the anatomical features, and by their mode of production.

GASTRIC ULCER FROM THE CLINICAL ASPECT. W. J. Mayo,¹ in this paper, which includes a discussion of duodenal ulcer as well, makes a report on the result of 1000 operations for gastric ulcer. Not all of these cases proved to be ulcer, and he includes in this article only those in which an actual demonstrable ulcer existed, that is, one that could be seen and felt in the stomach or duodenal wall.

Acute mucous ulcers heal, if the patient does not succumb meanwhile to perforation or hemorrhage. They are always multiple, and are caused by a variety of gastrototoxic substances, and the latter most commonly accompany cirrhosis of the liver, splenic anemia, and certain disordered blood states. Acute ulcers do not give rise to chronic indurated ulcers. Mayo says on several occasions he has examined the stomach and duodenum through an abdominal incision without finding any evidence of ulcer, which was subsequently discovered at a second operation, the continued symptoms demanding the latter.

Of the 1000 cases in his series, 428 were classified as gastric, and 572 as duodenal, although Mayo thinks this is an unfair percentage, as many of the gastric ulcers, in the light of present knowledge, should have been diagnosticated duodenal. Previous to June 1, 1906, 379 cases of gastric and duodenal ulcer were operated, with only 41 per cent. being classified as duodenal. From 1906 to 1911, 621 cases were operated upon, of which 64.5 per cent. were duodenal ulcers. This is of great interest, as it gives a good idea of how skill in the recognition of duodenal ulcer has progressed. A conservative estimate of Mayo's puts duodenal ulcer 2 out of every 3 cases of ulcer.

Most of the ulcers are situated within 2 inches of the pylorus, and the clinical picture is comparatively definite. The pain is the most striking symptom, coming on from one to three hours after meals, often in the night, and being relieved by alkalies or food. Hyperacidity and hypersecretion are common, the latter giving rise to some belching and eructations of acid fluid. Mayo believes hemorrhage, both visible and occult, is of little importance in the diagnosis, and the same applies to hematemesis. The most important sign, however, is food retention, which is recognized by finding small particles of food in the stomach

¹ *Annals of Surgery*, 1911, liv, p. 313.

eight, then, and twelve hours after meals. It is an indication for surgical interference.

The diagnosis between gastric and duodenal ulcers can usually be made without difficulty, and I am in accord with the statement that it is not essential, however, that such a diagnosis be made. If there is long interval between food and pain, and especially if the point of pain is a little to the right of the median line as well as in the epigastrium, the location of the lesion is usually in the duodenum.

The indications for surgical treatment are obstructive symptoms, repeated hemorrhages, severe pain, and poor digestion causing undernourishment of the patient. Also, if for any or all of these reasons, the patient is unable to maintain good physical condition on the food which his circumstances force him to obtain, or if his chronic disability interferes with his vocation. The operative mortality is only 2 to 4 per cent., and duodenal ulcers present a higher average of cures than operations for gastric ulcers. The operation of choice is gastrojejunostomy.

Mitchell, in the same number of the *Annals of Surgery* (p. 806), gives approximately the same mortality as Mayo, his being 2.7 per cent. in 110 cases. In addition to the symptoms given by Mayo, Mitchell emphasizes local tenderness, although it was present in only 10 per cent. of cases. He regards it as a danger signal, and says, that "severe or persistent tenderness is one of nature's calls for help, and, if neglected, the next and unmistakable call may be the tragedy of perforation." Hemorrhage, that is *visible* hemorrhage, was seen in 4 of the 110 cases, while local hyperesthesia was encountered in only 3 per cent.

In a paper read before the Association of American Physicians, Friedenwald¹ reports that 1000 cases of ulcer of the stomach and duodenum were found in 12,598 patients affected with various gastric disturbances. The greatest number occurred between the ages of twenty and thirty years, and, of this number, 676 were females and 324 males. The gastric secretion was normal in 46 per cent., there was hyperacidity in 30 per cent., and sub- or anacidity in 23 per cent. Pain was present in 94 per cent., and was especially marked in those cases which had hyperchlorhydria. In the majority of cases it appears two hours after food. There was tenderness in the epigastrium in 908 cases, and the dorsal tender point was frequently found. Vomiting was observed in 676 cases, being more common in those cases which had pain soon after eating and in which there was a high acidity. In 228 cases, gastric hemorrhage occurred.

Paus² is in accord with the teachings of our countrymen that duodenal ulcer is more frequent than gastric ulcer, but he thinks Mayo's and

¹ Abstract in Journal of American Medical Association, 1912, lviii, p. 1975.

² Berlin. klin. Woch., 1912, p. 397.

Moynihan's statistics are too high. His own show that men are more frequently affected with duodenal ulcer, while there is no sex discrimination in gastric ulcer. He points out the common occurrence of both duodenal and gastric ulcers with cardiovascular diseases.

PAIN IN GASTRIC ULCER. In 1909, Klippel and Weil¹ reported the occurrence of polyneuritis in gastric ulcer, since which time these observations have received confirmation from Couréménos and Conos.²

In a later paper Klippel and Weil³ report 2 more cases of paroxysmal pain, so much like the crises seen in *tabes dorsalis*, that in a third case, the diagnosis was made only at autopsy, which revealed an ulcer of the stomach, but no disease of the spinal cord. The authors claim that the knowledge of the occurrence of a "pseudo-tabes polynevritique" in gastric ulcer will be of considerable value in the diagnosis, and that the so-called cases of *tabes* exhibiting hematemesis with gastric crises must now be viewed in a different light.

Schur⁴ was interested in studying the relation between pains in gastric ulcer and hyperacidity. Some of his non-ulcer cases were observed for a long period of time, and he reproduces in a table a most interesting report of 3 cases, which were free from subjective symptoms at the end of from six months to a year, but whose gastric acidity was the same and even higher. The new theory that the gastric mucous membrane has become accustomed to the hyperacidity he regards as fatuous, also the theory of Kaufmann that gastric atony is the cause of pain.

Schur found that ingestion of 100 c.c. of a $\frac{1}{2}$ to $\frac{1}{10}$ normal HCl solution caused no pain in normal individuals, and even cases of hyperacidity with supposed "hyperesthesia of the mucosa" did not complain of any distress. A mixture of pepsin and hydrochloric acid was also without effect. Since the pains are usually produced one to two hours after meals, Schur extracted the gastric contents at the height of the pain, but found no increase in the hydrochloric acid values, and there was no increase in the albumin digesting process. He is positive in his statement that hyperacidity, as such, cannot cause pain, and that the so-called hunger-pain is not a symptom of hyperacidity. He also scouts the idea of a neurosis, and believes there must be an anatomical cause.

Through a process of very clear reasoning, coupled with illustrations from his medical and surgical experiences, he arrives at the conclusion that the cause of gastric pain such as is experienced in hyperacidity is a symptom of an ulcer and not of hyperacidity. The cause of the pain is mechanical irritation of the ulcer by the hydrochloric acid.

Pilcher⁵ believes that traumatism plays an important role in the

¹ L'Encephale, May, 1909, No. 3.

² Ibid., November, 1909, p. 423.

³ Presse Méd., 1911, No. 76, p. 753.

⁴ Med. klin., 1911, No. 24, p. 919.

⁵ Journal of Michigan State Medical Society, 1911, p. 511.

occurrence of pyloric ulcer. Of the diagnostic symptoms, pain is the most important, the regularity and precision of its return after eating being specially noteworthy. Its onset is definite, occurring usually about two hours after meals, but as striking as is the onset, no less remarkable is its cessation after more food or alkalis.

An unusual feature in 4 cases of chronic ulcer reported by Boschi¹ was the occurrence of pain only during the cold months. Such acerbation of gastric symptoms have been described by writers before the time of Boschi, but evidently the phenomenon has not become generally familiar. Murri, an Italian observer, claimed that cold affected the nerve endings in the skin, and, as a result, congestion of the abdominal vessels ensued. Boschi inclines to this view, but offers no proof of its correctness.

Dorsal Pain. The dorsal pain observed so often in gastric ulcer was first described by Cruveilhier, in 1852, since which time it has received a great deal of attention. It is often called "Boas' point of tenderness," as Boas laid special emphasis on its diagnostic importance. According to him, the tender point lies on a level of the tenth to the twelfth thoracic vertebra, 2 to 3 cm. laterally to the vertebral column, in an area of 1 to 4 cm. It is generally greater on the left side, but it is found on both sides occasionally, and often only right, the latter situation being common when the ulcer is at the pylorus or in the duodenum. The point of tenderness may be as low down as the first lumbar vertebra. Yukawa,² in an article devoted to a study of gastric ulcer in Japan, says that he found it present in 87.1 per cent. of his cases, and Seidl³ dedicates a long paper to its consideration.

In over 100 cases studied by the latter, he has found the dorsal pain to be a most valuable diagnostic aid. The deeper and larger the ulcer, the more numerous, the more painful, and the larger are the points of tenderness. He has been able, under treatment directed toward the cure of the ulcer, to see how rapidly these disappear. They are usually about the size of a cent, but may be as large as a dollar, and may be on either side or on both. Seven cases were controlled by autopsy and Seidl makes the interesting observation that the number and localization of the points bear a certain relation to the situation of the ulcer. They can therefore be regarded as some indication for the localization.

In ulcer of the pylorus the pain is more pronounced on the right side, sometimes it is encountered only on that side. It is situated at the margin of the tenth to twelfth dorsal and first to third lumbar vertebrae. In ulcer on the posterior wall of the stomach, the number of painful areas reach to the cervical vertebrae, so that Seidl found as many as seventeen points of tenderness. Ulcers of the lesser curvature are

¹ Archives des Maladies de l'Appareil Digestif, 1911, xxxv, p. 324.

² Archiv f. Verdauungskrankheiten, 1911, xvii, p. 337.

³ Ibid., p. 722.

accompanied by a chain of tender points from the seventh dorsal to the third or fourth vertebra.

In examining for these points, the patient jerks involuntarily, the head is bent forward, the forearm flexed, the recti and the serrati are made tense. The inspiration is jerky, and occasionally singultus is encountered. (These symptoms have received from Seidl the name "Zuckungsphänomen.") The mode of examination is as follows: The patient assumes a comfortable position, with the physician on his right side. The examiner's left hand is passed along the border of the twelfth rib to its articulation with its vertebra, and there the middle finger exerts a gradually increasing pressure, which is followed by the Zuckungsphänomen. The eleventh rib is palpated in the same region

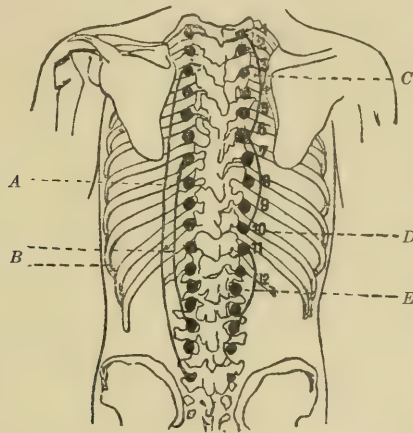


FIG. 1.—Scheme of the dorsal pressure points in localization of ulcer of the stomach. *A*, posterior wall of the stomach, the prevailing pressure points are always on the left; *B*, lesser curvature, the pressure points are usually equally strong on both sides; *C*, in extensive ulcers of the posterior wall the pressure points are symmetrically arranged; *D*, prevailing in ulcer of the cardia; *E*, in pyloric ulcer or duodenal ulcer adjoining the pylorus, the pressure points are more painful on the right side, or limited to it exclusively. (Seidl.)

in the same way, and the examination is continued until no tender points are found. In the same way the lumbar region is palpated, and the right side of the patient is examined in a corresponding manner. In cases where other organs are involved in the perigastritis, there is such hyperalgesia that even the slightest pressure is painful, although the simple stroking of the hand causes no discomfort.

In erosions, tender points are found similar to those elicited in ulcer. In gastric neuroses and gastropotosis, although in some cases there was a symptom-complex having a decided resemblance to ulcer, no point of tenderness was ever found. I have reproduced an illustration from Seidl's article which will give an idea of the tender points as they occur in gastric ulcer.

X-RAY DIAGNOSIS OF ULCER. Adler and Ashbury¹ base their diagnosis on the idea that the crater of an ulcer will retain a salt of bismuth after the normal mucosa has been cleared of it by the peristaltic action of the stomach and intestine. After giving details regarding the preparation of the patient, the technique of the x-ray itself, the authors state that the stomach will clear itself of 90 grams of bismuth within four hours, and that after that, if a shadow is seen, ulcer should be suspected. Also they believe that if there is an absence of the bismuth shadow from the stomach area, excepting in small isolated spots, there is certainly an ulcer present. I am of the opinion that work has been done along similar lines by foreign skiagraphers, and has been subsequently shown to be of little value. (See Schmieden, *Archiv f. klin. Chir.*, 1911, xcvi, p. 263.) The cuts illustrating Adler and Ashbury's article are not sufficiently clear for a mere tyro to make out the points of importance brought out by the writers, so I abstract the article for what it is worth, leaving those more experienced to judge of its merits.

Owing to the *noli me tangeri* attitude which many of our foremost skiagraphers bear toward the fluoroscopic examination, the article by Eisler² seems destined to have no confirmation or refutation in America. It is well known that in ulcer there is a spastic or tetanic contraction of the musculature, corresponding to the site of the ulcer, and Eisler gives the additional information that small ulcerations and erosions can be recognized only in the empty and partially filled stomach by a slight contraction of the greater curvature, but that this contraction is lacking in a stomach which is filled with bismuth water. To detect these minor contractions, the patient is instructed to take but one swallow of the bismuth mixture, when there will be seen for an instant only a local drawing in of the gastric curvature, which disappears immediately when one drinks or when pressure is exerted on the abdomen. Owing to the fugaciousness of the sign, a picture cannot be taken of it.

Stierlin³ shows some pictures of spasm of the stomach, such as occurs in ulcer, and he believes such contractions to be an important point in the diagnosis of ulcer.

TREATMENT OF ULCER. The healing of a gastric ulcer is interfered with by the digestive action of pepsin and hydrochloric acid, so the indications for treatment, according to Glaessner,⁴ is to paralyze this action.

There are three ways by which this may be brought about and each of these is considered in detail:

¹ New York Medical Journal, 1911, p. 721.

² Münch. med. Woch., 1912, p. 702.

³ Ibid., 1911, pp. 796 and 873.

⁴ Med. Klin., 1911, p. 373.

1. *Inhibition of the Gastric Secretion.*

(a) *By Properly Selected Food.* It is well known that the gastric juice behaves differently with different foodstuffs. For instance, meat and meat extracts cause a great flow of juice, carbohydrates not so much, and fats the least. In man, Bickel has demonstrated that gastric juice is stimulated by skimmed milk, yolk of eggs, boiled egg white, raw or cooked meats, and that the gastric juice is inhibited to a greater or less degree by milk, carbohydrates, egg white, and fatty substances. The influence of meat, etc., experimentally, is acknowledged, but it is also a matter of general information that a vegetable diet excluding meat is nowise conducive to the healing of an ulcer, and, furthermore, statistics show that people who eat an almost exclusive vegetable diet are rather subject to gastric ulcer.

(b) *Drugs.* Only one drug may be said to inhibit the gastric juice, and this drug is *atropine*. Riegel prescribed it in 1 mg. doses, three times a day, but Glaessner calls attention to the not harmless action of the drug. He mentions, under the heading of drugs, the action of *hydrogen peroxide*, about whose remarkable actions in lowering the acidity of the gastric juice I¹ wrote a few years ago. It is true that the action of this chemical is not in any way a nerve action, but is due rather to the production of mucus, caused by degeneration of the cells of the mucosa. I think Glaessner makes a good point when he says, "I question the advisability of controlling the hydrochloric acid and secretion by producing a gastritis."

2. *Combining the Gastric Juice.* On account of the well-known affinity between albumin and hydrochloric acid (combined hydrochloric acid), milk has achieved a great reputation, and also raw eggs. Fat is an ideal measure to combine the acid and also has the property, as we have learned, of lessening the amount of gastric juice. The treatment of gastric ulcer by oil has acquired great renown, but the great objection to the use of oil is the distaste for it, of which patients so complain. It is apt to cause belching, retching, and vomiting, conditions which we should be most careful to avoid.

Of *drugs* employed to neutralize the acid, *sodium bicarbonate* is most frequently employed, but its effects, while rapidly beneficial, as rapidly disappear. *Bismuth nitrate* is used a great deal, but Glaessner questions its efficiency, and since certain cases of poisoning have been reported by the production of nitrous acid, its use has been somewhat restricted. Of the newer drugs, *escalin* (a paste of aluminum and glycerin) and *neutralon* (aluminum silicate) are not of much value. Glaessner is enthusiastic about *Carlsbad* and *Vichy water*.

3. The method of *neutralizing the acid and lessening secretion* is based on the principle of giving the original tissue rest.

¹ Goodman, New York Medical Journal, November 6, 1909.

(a) *Withdrawal of Food* would seem to be an ideal method, but, unfortunately, the empty stomach, in cases of gastric ulcer, secretes acid juice, so this *modus operandi*, practically, is not ideal. *Feeding per rectum* is often practised, and, although opinions differ as to the amount of resorption taking place from the rectum, yet it is generally accepted that carbohydrates (70 per cent.) and a small proportion of albumin are absorbed. Of the Boas nutritive enema consisting of 200 grams of milk, 2 eggs, 1 teaspoonful sugar, a pinch of salt, and 10 drops of tincture of opium, only the sugar and salt are absorbed. Glaessner's enema is made up as follows:

Glucose	50 grams
Pepton	30 grams
Alcohol	10 grams
Water	250 grams
Tincture of opium	few drops

Two bad features of rectal alimentation which must not be lost sight of, however, are putrefaction of the protein material in the bowel, with excessive resorption of these decomposition products, and also the stimulation of gastric juice as has been shown by Umber to take place.

(b) *Diet.* Our author then takes up the question of the von Leube and Lenhartz diets which latter are too well known to need mention here.

Glaessner, in a very brief note, makes the interesting communication that experimentally he has found intestinal juice and bile to have a marked reducing effect on the amount of hydrochloric acid and pepsin, and suggests that future work along a similar direction may be productive of a new method of treating gastric ulcer.

His article, which is entitled "Newer Points of View in the Internal Treatment of Gastric Ulcer," is very interesting, as it offers, in easily digested form, the most important of the newer ideas.

Rowlands¹ believes that acute ulcers, as a rule, do not receive the proper medical treatment, *i. e.*, adequate rest and a suitable diet are not insisted upon for a sufficient length of time. Even those patients who are ill enough to be admitted to a hospital are scarcely ever kept there longer than a month, and are then permitted to return to their ordinary life without any written instructions concerning their diet and mode of life. The teeth are rarely put in order, and the usual result is, that although the symptoms may be alleviated for a time, the ulcer is not healed. A simple ulcer need have no complications beyond hemorrhage, and should be cured by three months' rest and careful medical treatment.

Rowlands, a surgeon, is to be congratulated on his very broad views, and I can heartily subscribe to them. The reproach that an acute ulcer is not treated medically for a sufficiently long time, is deserved

¹ Practitioner, 1911, lxxxvi, p. 800.

in part, but my experience has been that, with the amelioration of symptoms, the patients become restive, and, despite arguments on the part of the attending physician, are rarely content to remain for three months in a hospital or under treatment for that length of time. This is no argument against Rowlands' views, but is offered in extenuation of what he believes to be the internist's error.

Gilbride¹ advises the Lenhartz treatment on account of the ease with which it can be carried out at the patient's home.

End Results of Operation for Ulcer. A very interesting and novel research is reported by Heyrovsky² on the study of the gastric mucosa in ulcer and carcinoma. Crämer³ had, the year previous, published an article wherein he endeavored to show that there was a certain unmistakable relation between the chemistry of the stomach and the histology of the mucous membrane. His were cases operated on, the mucosa being removed at the time. When there was normal acidity, the mucosa was normal; but when the acidity was subnormal, various stages of gastritis were observed.

Heyrovsky makes the well-known statement, that even after a gastro-enterostomy performed for gastric ulcer, symptoms persist, and his very pertinent and decidedly new research is to study the relation which exists, if there may be any such relation, between the condition of the mucous membrane examined at the time of operation, and the subjective condition of the patient after operative treatment.

One hundred and twenty cases were studied, 70 of which were gastric ulcers, 7 duodenal ulcers, 15 malignant degeneration of an ulcer, and 28 carcinoma cases. At the time of operation, a long strip of mucous membrane was removed, and Heyrovsky immediately disarms criticism by acknowledging that a small portion is not an infallible index to the condition of the remainder of the stomach. The mucous membrane was of the pylorus type.

Of the ulcer cases, the mucous membrane was normal in 45.5 per cent., and was the seat of a pronounced gastritis in 51.5 per cent. In the other conditions the results were as follows:

Duodenal ulcer	gastritis in 42.9 per cent.
Carcinomatous ulcer	gastritis in 66.6 per cent.
Carcinoma	gastritis in 78.5 per cent.

He calls attention to the presence of solitary lymph follicles in the fundus in 58.8 per cent. of the cases of ulcer with otherwise normal fundus, and it is here that the chronic gastritis begins, he believes. In the cases of ulcer associated with gastritis, there were numerous follicles in the fundus in 94 per cent. of the cases, and in these cases

¹ New York Medical Journal, 1911, p. 333.

² Wien. klin. Woch., 1912, p. 80.

³ Archiv f. Verdauungskrankheiten, 1911, xvii, p. 1.

there was follicular erosion with attempts at scar-tissue formation, and he thinks that these are the areas which have a tendency to ulceration. This is, I believe, a comparatively new observation, and at once raises the point whether follicular erosion is a stage of an ulceration.

Now follows the most interesting point from the standpoint of the clinician. Forty-three patients were followed after operation, and their past operative history was carefully noted. I have tabulated, in comparative tables, the after history of those whose mucous membrane was normal, and that of those whose mucosa showed evidences of chronic gastritis.

	Normal mucosa.	Gastritis.
Free of symptoms	64.6 per cent.	46.2 per cent.
Mild symptoms	26.6 per cent.	34.6 per cent.
Severe	11.8 per cent.	19.2 per cent.

The work of Heyrovski would seem to show that chronic gastritis is the cause of the persistency of gastric symptoms after gastro-enterostomy, an hypothesis which has been discussed before, but which, I believe, has not been definitely proved.

Fink,¹ in speaking of the return of subjective symptoms after a gastro-enterostomy, reports a case in which, after two years of good health, there was a recurrence of hematemesis, etc. A second operation revealed an ulcer at the same site as the first one, having developed following the closure of the gastro-enterostomy opening.

The comprehensive article by Albrecht,² covering almost 150 pages, including the report of numerous cases, entitled the "Result of Gastro-enterostomy Performed for Ulcer and its Complications," is worthy of review. He discusses at some length the opinions of well-known authorities on the advisability and influences of gastro-enterostomy, and, after considering in detail the etiological factors, and subjective and objective symptoms, sums his opinion regarding the operation in the following: (1) Uncomplicated ulcer is not a surgical condition. (2) As indications for gastro-enterostomy, stenosis is the most important, then follow perigastritis, gastrosuccorhea, and recurrent hemorrhages.

Of the 40 cases operated on, 32 were relieved of subjective symptoms immediately, 4 were somewhat improved, 2 were but slightly, and 2 died. Twenty-two patients were followed for from four to six months to twelve years after operations, and in a very complete and painstaking way Albrecht describes the subjective and objective symptoms, and the chemical examination of the stomach contents.

The permanent results were not as satisfactory as the immediate, as the latter were 80 per cent. and the former 66.6 per cent. Two-thirds of all operations were permanently relieved or certainly very much better in our author's opinion. The danger of carcinoma

¹ Zentralbl. f. Chir., 1911, p. 1497.

² Beitr. z. klin. Chir., 1911, lxxiii, p. 431.

developing in the ulcer when only a gastro-enterostomy is performed is very slight.

In the absence of any terse conclusions as is customary in the majority of German articles, it is difficult to put into so many words the opinion of Albrecht, but I have gathered the impression that his experiences have enlisted him on the side of the non-combatants. He seems to show that the majority of cases are better after a gastro-enterostomy, but not so much better that he waxes enthusiastic over the operation.

In the van of those who show signs of wavering in their faith in gastro-enterostomy, stands the master mind of Mayo-Robson. He says¹ in no uncertain manner, "I think the time has come for a reconsideration of the operation of gastro-enterostomy, of the class of cases in which it is justifiable to perform it, and of whether or not one can suggest a better way, in some cases, of giving the stomach and duodenum absolute rest until ulcers or other disease may have healed and been remedied." This warning is prompted by an unpleasant experience of jejunal and gastrojejunal ulcers, following operations by himself and others. The article will undoubtedly receive its merited review in the section of Abdominal Surgery, but brief mention of it I regard in place in this department also. Internists have been not too enthusiastic about the operation of late, and their reluctance in consenting to its performance in ulcer cases will receive support in this article by Mayo-Robson. The operation which he proposes as a substitute is that of jejunostomy.

PERFORATED GASTRIC ULCER. Mannheimer² recalls the views regarding the peritoneum and the relation it bears to leukocytosis in connection with a research which he undertook to study the value of leukocytic counts in perforated gastric ulcer. Ulcer of itself is accompanied by no rise in the number of leukocytes. In perforations, variations in the picture are seen sometimes as leukocytosis and sometimes normal leukocytes. This difference may be explained by many factors. In the first place, the leukocytosis depends primarily on the peritoneal infection, and in certain cases the latter is of but minor importance, as it may become encapsulated at once and remain limited as such. Furthermore, the nature of the infection and the extent to which fluid invades the peritoneum vary, and hence the blood picture must be a varied one.

As a diagnostic sign of perforation itself, the study of the leukocytes promises but little, although in distinguishing between gastralgias of nervous origin which may, by the way, simulate most minutely a perforated gastric ulcer, and appendicitis or infections of the biliary tract, it has some value. Prognostically, the following may be written:

¹ British Medical Journal, January 6, 1912, p. 1.

² Mitt. a. d. Grenzgeb. d. Med. und Chir., 1911, xxiii, p. 553.

(a) General condition good, moderate local symptoms and low leukocyte count. Prognosis is good, infection is mild.

(b) General condition good, severe local symptoms with high leukocytosis. Prognosis is good. The infection is severe, but the organism reacts well.

(c) General condition is poor, several local symptoms with low leukocytes. Prognosis is bad. The infection is severe, but there is no reaction.

The epigram of Sonnenburg's is worthy of memorizing. "The condition is always serious when any symptom is missing."

Haudek's x-ray sign of a perforated gastric ulcer is criticised by Schlesinger,¹ who found the same half-moon air bubble in a case of diverticulum of the stomach.

Riese² describes a case of callous ulcer of the lesser curvature, which, four months previous to operation, had probably ruptured into the liver, and had set up in that organ a circumscribed focus of inflammation. The left hepatic duct was infected and by means of this the gall-bladder, which finally became gangrenous. In the *British Medical Journal*, May 25, page 1178, Spittel reports 4 cases of perforation.

ACUTE ULCER OF THE ANTERIOR WALL. A case of acute ulcer occurring on the anterior wall of the stomach is reported by Bassler³ on account of the rarity of the condition and the difficulty in diagnosing it. The diagnosis was made, in Bassler's case, principally on an area of tenderness two inches above the transverse umbilical line to the left, in which area there was a mass which Bassler believed was due to plastic exudate. The x-ray revealed, among other things, an ulcer bed lined with bismuth, whose area coincided exactly with the area of abdominal pain, when the plate was held against the patient's body. Under appropriate treatment the patient made a complete recovery.

HOURL-GLASS STOMACH. Spannaus⁴ divides the hour-glass stomach into two kinds.

1. The congenital.
2. The acquired.

In the early days of the "Sanduhrmagen," this form of stomach as a result of ulcer was not known, and even the adhesions and ulcers in the constriction were held to be secondary to a congenital defect. It may be that the reader is not familiar with the views offered to explain the congenitally deformed stomach, and I believe he will be interested with the brief historical résumé concisely given by Spannaus.

Morgagni believed very strongly in heredity, and mentions a family

¹ Berl. klin. Woch., 1911, p. 1645.

² Deutsch. med. Woch., 1911, p. 1939.

³ Journal of the American Medical Association, 1911, lvii, p. 282.

⁴ Beitr. z. klin. Chir., 1911, lxxv, p. 261.

in which three generations had the defect. Other authors believed in atavism, and pointed to the stomachs of certain ruminants which have normally this form. Williams recalled the observations of older anatomists concerning the physiological constriction about the middle of the stomach, and said the hour-glass form was due to excessive contraction of this physiological narrowing. Wullstein regarded the anomaly as deficient development, the pylorus part remaining of the intestinal type, and the cardiac alone expanding to join the true stomach. Pressure from neighboring organs was supposed to aid in the segmentation.

An opponent of the atavistic theory arose in Hudson, for he had never observed the form in the higher apes, and, furthermore, there were many points of difference between the ruminant stomach and man's. Some enthusiast discovered that each segment of the hour-glass stomach had its special blood supply, and held this to be proof of the congenital nature of the condition, but Leriche found the same arrangement in normal stomachs, so the supposed proof soon collapsed.

Although all of the theories were shown to be based on insufficient evidence, the congenital theory has received a tremendous support in the report of Sandifort's case observed in a fetus. Moynihan insists that this stomach is not a true hour-glass stomach. The answer to Sandifort's case is that the fetus suffered from an intra-uterine gastric ulcer, which underwent spontaneous cure, leaving the stomach deformed. That there is such a condition as fetal ulcer is shown by a case of Godhart, which died thirty hours after birth, of hemorrhage from a gastric ulcer. In view of the findings of Sandifort and of Godhart, it would probably be better to speak of the anomaly as intra- or extra-uterine acquired hour-glass stomach.

The acquired form has many causes, and of these may be mentioned ulcer, carcinoma, ingestion of acids, spasm of the musculature, and tight lacing.

Spannaus makes a report on 34 cases of hour-glass stomach, of which none could be regarded as congenital. The most common etiological agent was ulcer located on the posterior wall and the lesser curvature. In the great majority of cases the constriction is in the form of a ring, the stomach is freely movable, and there is no sign of an ulcer as such. In a lesser number, the ulcer is seen as a flat, hard area about the size of a dollar, and the stomach is adherent to the posterior wall and the pancreas. Occasionally the ulcer is in the form of a tumor.

The author describes in detail the anatomical features of his cases, giving interesting illustrations which illuminate his text to a great extent. As far as symptoms are concerned, they bear a close relationship to those of pyloric stenosis, and, of these, the principal are vomiting, pain, and loss of weight. There is no symptom-complex by which we

are enabled to diagnosticate hour-glass stomach, and the diagnosis must be made on the history, laboratory tests, inflation of the stomach, x-rays, and laparotomy.

There is no typical alteration in the gastric chemistry, and one may find acid values which are normal, low, or high, or even anacidity may be seen, with the presence of lactic acid.

I am quoting ten specific methods of examination which may help in the diagnosis.

1. When lavage is practised, part of the water is not recovered, as it flows through the stenosis into the pyloric region (Wölfler's first symptom).

2. If, when the stomach is washed clean, there appears a sudden gush of ill-smelling contents, this material comes from the pyloric portion of the stomach (Wölfler's second symptom).

3. There is a succussion splash, which is heard even when the stomach is supposedly empty, and is due to fluid in the pylorus part (Jaworsky's paradoxical dilatation).

4. When the stomach is inflated, there is a prominence, first in the left part of the epigastrium, which becomes less in a few minutes, and a prominence in the right side is seen (v. Eiselsberg's first symptom).

5. When a Seidlitz powder is taken, with the stethoscope one hears a hissing sound at the pylorus. In stenosis of the stomach, a rustling sound is heard 5 to 8 cm. to the left of the median line (v. Eiselsberg's second symptom).

6. If the stomach is percussed after inflation following the taking of a Seidlitz powder, there is tympany over the upper portion of the stomach and not over the pylorus. If the observation is continued for some time there will be noticed a gradual prominence of the pyloric portion (Moynihan).

7. There is a definite groove between both parts on inflation (Schmid-Monard). Pressure on the one part causes prominence of the other (Moynihan).

8. If the stomach is filled with water and transilluminated, only the cardiac portion is translucent.

9. If the hand is laid on the stenosis and the cardiac portion pressed upon, a sensation will be felt as when fluid is squirted through a narrow tube.

10. The clear wash water becomes discolored when the patient lies on the left side (Schmidt). Moynihan believes that the first symptom of Wölfler is the most important.

According to Spannaus, the methods 1, 2, 4, and 7 are the most valuable. He is especially enthusiastic about the methods which have to do with inflation of the stomach, and he recommends, as I believe everyone does now, the use of the stomach tube instead of the Seidlitz powder. Spannaus has been able to diagnosticate 50 per

cent. of his cases without the *x*-ray, but he urges that the latter be used in every case, as its help is invaluable.

The prognosis of unoperated cases is unfavorable, and his indications for the kind of operation to be performed are as follows:

Resection is to be recommended for every case of callous ulcer, provided the patient is in good condition and the stomach is not too adherent to neighboring structures.

Gastro-enterostomy is less severe than resection, and is to be advised for nearly all cases of hour-glass stomach. It is not so suitable for these cases where the cardiac portion is small and the pyloric part large.

The gastro-anastomosis is to be performed when the pyloric is larger than the cardiac portion, and when the stricture is located on the lesser curvature.

Gastroplasty demands for its proper technique, a free, short stenosis and sound tissue. The cardiac stomach must not be too large, as there may be food stagnation resulting. A callous ulcer and strong adhesions are contraindications to the operation.

Härtel¹ believes that the *x*-ray diagnosis is the most important, but that one must always be on the lookout for a "spastic hour-glass stomach, as this form simulates, clinically, the true variety. By a spastic stomach Härtel means one that shows a ring-like constriction about the middle, which persists for years, but which at operation totally disappears. Four points of differentiation by means of the *x*-ray are described by Härtel. In a spastic stomach, there is (1) rapid filling of the second pouch immediately after eating; (2) the lumen of the stenosis is sometimes narrower and sometimes broader; (3) the shape of the constriction, which is usually on the greater curvature, varies; (4) atropin relieves the spasm.

In an article devoted to the *x*-ray diagnosis of the hour-glass stomach, Legros² describes the types of normal stomachs, and their pathological variations, with ample illustrations. It is an article which will appeal directly to the skiagrapher, for it is to him that it is dedicated, but it has an interest for the internist owing to the proof it affords of the value of the *x*-ray in the diagnosis of the hour-glass stomach.

Kretschmer³ offers for consideration a paper on the same theme, claiming for the *x*-ray the principal role in the diagnosis of hour-glass stomach. He insists, however, that not every constriction is to be regarded as a stenosis of the pars media of the stomach, as in ulcer of the lesser curvature there is sometimes a drawing-in of the corresponding part of the greater curvature, without any stenosis whatsoever.

¹ Archiv f. klin. Chir., 1911, xevi, p. 1.

² Archives d. Mal. de l'App. Dig., 1912, vi, p. 79.

³ Berl. klin. Woch., 1911, p. 1319.

The true hour-glass stomach, from the standpoint of the Röntgenologist, consists of two distinct sacs, connected by a scarcely visible isthmus. If one makes a fluoroscopic examination, the diagnosis is absolute when one observes the filling of the lower pouch, due to emptying of the upper. A most characteristic and diagnostically important appearance is that of layers of bismuth with an air-bubble in each sac. These three *x*-ray features indicate positively the presence of an hour-glass stomach, and Kretschmer does not believe a carcinoma ever simulates this. In malignancy the division between the two parts is seen as a horizontal and vertical band, while in benign stenosis the constriction is more or less horizontal. Another point of distinction is, that in malignancy both portions fill equally, while in hour-glass stomach the lower is filled by the upper emptying into it.

Gastric Cancer. DIAGNOSIS OF GASTRIC CANCER. An excellent article, and one which all are recommended to read in the original, is written by Boas¹ on "The Early and Late Diagnosis of Gastric Cancer." Scarcely a year passes that some enthusiast does not describe a new method for the early diagnosis of carcinoma of the stomach, and so numerous have these become, that one must be possessed of an unusual amount of optimism and "arbeitsfreudigkeit," to busy himself with them. And yet it is not strange that with all these laboratory tests being almost daily recommended, but few investigators really put to themselves the very vital question: What is meant by an "early" diagnosis of cancer, and how can we know for a certainty that such and such a diagnostic measure really permits of an early diagnosis?

What is meant by early diagnosis? Some understand it as meaning when there is no determinable tumor upon palpation, but this is undoubtedly a wrong definition, as there are many cases of advanced cancer with absolutely negative palpatory signs.

Others mean when there is no metastasis. This is again wrong, as the autopsy *in vivo* often shows, even a short time after the first symptom appears, such general involvement that talk of early diagnosis is out of the question. Certain changes in the chemistry of the stomach so well known that they may be unmentioned, are decidedly unreliable. Even the *x*-ray, from which so much was expected, has brought the matter no closer to a solution.

Boas concludes that the fundamental error in all the modern methods is that one does not make a sharp line of distinction between diagnosis, differential diagnosis, and early diagnosis. It cannot be denied that some tests do assist as regards the first two, but none, except the autopsy *in vivo*, can be regarded of any value in the early diagnosis. Boas insists that such a test must really detect a cancer in its earliest stages, and that as a result—

¹ Deutsch. med. Woch., 1911, p. 2277.

1. The operative mortality must be decidedly reduced.
2. There must be an increase in the number of radical operations.
3. The duration of life after operation must be lengthened.

If a so-called test does not fulfil these three postulates, then it cannot be considered an early test. All of the tests so far reported are lamentably deficient in this respect, as they only offer diagnostic aid, and have really not been of any value in diagnosing cancer in its incipient stage.

Boas says that the subject of early diagnosis has so fascinated clinicians that they have totally forgotten or overlooked the late diagnosis, which our author believes is of great practical importance. He defines his strange-sounding designation, as pertaining to that stage of development when all operative and therapeutic procedures must be regarded as offering no hope. He adds, with great emphasis for the benefit of those who wilfully or unwittingly misconstrue his expression, that he has no desire to proclaim "late diagnosis" as a goal for which to strive. The practical value which late diagnosis possesses is that it classifies at once those cases which are inoperable. This is a step in a new direction, as heretofore internists as well as surgeons have not been able to tell before operation whether a case was operable or not. Instead of searching for phantastic new symptoms of an early cancer, Boas pleads *faute de mieux*, to improve the semeiotics of late symptoms so that we can sharply differentiate the early cases from the late cases.

The signs with which we are all familiar, and which decide us not to operate in a given case, are palpable nodules in the omentum, involvement of the liver and biliary passages, glandular enlargements, especially in the supraclavicular, axillary, or inguinal chains, and, in rare cases, metastasis to the umbilicus. These are indications which even a tyro may see, but there are cases which are inoperable in the absence of these, and it is to diagnose this kind of a case, not the case *in extremis*, which is the theme of this paper.

The sign of a late diagnosis on which Boas lays great emphasis is the occurrence of metastasis in the rectum. This feature, first thoroughly described by Schnitzler, Boas has found present in 20 to 30 per cent. of his gastric cancer cases. The metastasis may be felt in the rectum on its anterior wall, 2 to 4 cm. above the prostate, as a hard nodulated mass. This secondary involvement of the rectum is distinguished from true cancer by absence of ulceration, and lack of involvement of the mucous membrane, which gives to rectal carcinoma the typical funnel-shaped appearance. The rectal condition is absolutely without symptoms. Although it occurs especially in men, it is also seen in women.

The Secondary Involvement of the Rectum is of practical importance, as it first may give a clue to the diagnosis. Boas admits that this will rarely be the case, but he quotes an instance when, by this sign, the

condition was first definitely recognized. Prognostically, it is of great importance, as the presence or rectal nodulation absolutely precludes operation. Finally, surgeons should be familiar with this sign, as knowledge of it will prevent them from operating, believing it to be a purely local condition.

A second site for metastasis of gastric cancer is the ovaries, and involvement of these structures is also a contraindication for operation. Boas claims that there is a disappearance of the semilunar space (Traube) in carcinoma of the fundus, although he wisely refrains from stating its worth as a late sign. Signs which have heretofore been regarded as merely of diagnostic importance may have a prognostic significance, and of these he mentions the Brieger-Trebing cachexia reaction, and includes the various serological and biological methods.

Although I have already abstracted this masterly article of Boas somewhat fully, I am translating his summary, for it may be regarded as the text on which his article is based.

1. The only criteria of an early diagnosis of cancer of the stomach are, first, a visible early stage of the disease, and, what is more important, an improvement of operative results.

2. Heretofore, none of the so-called "early signs" has fulfilled these postulates in any way.

3. Instead of pursuing these postulates farther, it is more practicable and more easy of attainment so to improve the late symptoms that we can decide before laparotomy which are early and which are late cases. We possess many important signs, but in the future these should increase in number.

4. An accurate knowledge of the late symptoms of carcinoma is of great value to a surgeon, as by this information the number of unsatisfactory exploratory laparotomies can be decidedly decreased.

Without making any reference to Boas' article, Turner¹ describes the importance of pelvic deposits in the diagnosis of abdominal cancer. He says, "In a certain proportion of cases in carcinoma in the upper abdomen, portions of the growth-fluid find their way into the general peritoneal cavity, and then into the pelvis where they become implanted and grow, in many cases giving rise to a mass easily palpable *per rectum*." The masses are to be felt in the rectovesical pouch, on the anterior wall of the bowel, within three or four inches of the anus. They may be single or multiple and are detected either as a definite fixed nodule or nodules, or as an infiltration. As a rule, they feel about the size of a small hazel-nut, although they may be larger. There are usually no accompanying symptoms. He emphasizes that although one may not be able to make out any dissemination of the cancer on

¹ British Medical Journal, February 3, 1912, p. 229.

abdominal examination, there may be quite a considerable deposit in the pelvis, easily recognizable on rectal examination and without any symptoms to point to its presence.



FIG. 2.—Drawing of the parts from the case of M. P. described in the text. It represents a vertical section of the pelvic peritoneum, and shows deposits of growth in the rectovesical pouch. They were easily felt from the rectum as hard, fixed nodules. (Turner.)

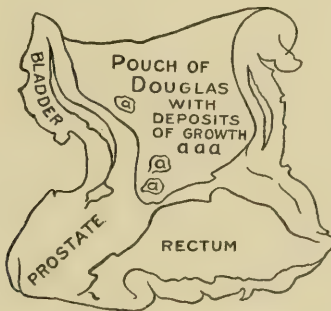


FIG. 3.—Diagram explanatory of Fig. 2. (Turner.)

As early as 1908, Turner penned the following lines, which I think must have escaped Boas' notice, otherwise he would have given them space in his article: "Now, cases in which the abdomen contains fluid are usually beyond surgical aid, for it means involvement of the peritoneum by growth. But there are cases in which there is extensive

peritoneal involvement, and yet no fluid, and, in a fair proportion of these, deposits can be felt in the pouch of Douglas. This sign has often been of great help to me, not only for the purpose of diagnosis, but because it shows that the patient's lease of life is rapidly running out, and that a radical operation can scarcely be of any avail." Have we not here the sign that Boas describes as a valuable one of the "Spätdiagnose"? Figs. 2 and 3 are reproduced from Turner's article.

Cade¹ calls attention to the following esophageal symptoms observed in massive cancer of the stomach; vomiting, which arises immediately after meals; pain on swallowing, first of solids, then of liquids. There is, however, with these symptoms of esophageal stenosis, no obstruction to a bougie, and Cade attributes these symptoms to retraction of the stomach, to its loss of elasticity, and to the gaping condition of the cardia.

D'Este² reports a third case in which Tansini's sign was present. This sign consists of retraction of the abdomen in cancer of the pylorus, and bulging when there is metastasis. My inability to read Italian prevents me from being any more explicit about this so-called "sign of Tansini."

A sign mentioned by Boas in his article as an evidence of gastric carcinoma, is secondary involvement of the umbilicus. This has received consideration from Oettinger and Marie,³ who state that although it is seen in cancer of the ovaries, of the uterus, liver, gall-bladder, intestines, and rectum, it is more frequently observed in cancer of the stomach. They claim that, in doubtful cases, umbilical cancer is often the first diagnostic sign, and is far more important than the enlargement of the supraclavicular glands. It is easy of detection if one remembers its occurrence, but can be easily overlooked if one is not familiar with its existence. It is not painful, and the patient's attention is rarely ever directed toward it. When it can be seen on inspection, its small volume, and its hiding place in the umbilical depression, tend to cause it to escape the eyes of those who are not looking for its presence.

In the beginning the umbilical involvement appears as a simple violet-colored pimple, which is at first very small, but which eventually surrounds the entire umbilicus. Often it is a simple wrinkling or a partial contraction associated with some induration, and again it is felt as a firm area continuous with the abdominal wall. In the later stages the umbilicus appears as a slight projection surrounded by a furrow, the skin is somewhat violaceous, and adherent, but the tumor is painless. The latter seems to be connected with the stomach

¹ Arch. d. Mal. d. l'App. Dig., 1911, v, p. 611.

² Journal of American Medical Association, 1911, lvii, p. 1333; abstract.

³ Arch. d. Mal. d. l'App. Dig., 1911, v, p. 289.

by a fine cylindrical-shaped stem. In other cases the umbilical involvement is in the form of cancerous fistula.

If the paper of Boas is as generally read and his views as widely accepted as the worth of the article demands, perhaps those who accept his suggestions to study late symptoms, may see in this umbilical involvement of Oettinger and Marie, a not unimportant sign of the inoperable nature of the case.

It will be interesting to watch the development of this subject, and by a careful weeding out of worthless signs, our symptomatology of advanced carcinoma will be materially enriched, and a valuable addition to our diagnostic armamentarium obtained.

MacDonald¹ urges, as do we all, the early diagnosis of gastric cancer by means of a careful history and painstaking chemical examination of the patient. He believes testing for albumin in the gastric contents is valuable.

THE GLYCYL-TRYPTOPHAN AND TRYPTOPHAN TEST. In PROGRESSIVE MEDICINE, December, 1911, p. 37, my predecessor, Dr. R. S. Laven-son, reviewed at some length the glycyL-tryptophan test, quoting numerous articles which had been published concerning it. Kayser² has made, for the last two years, studies on every case of gastric carcinoma from the standpoint of the *x*-ray and of the tryptophan reaction. His idea seems a good one, as both are held by those experienced in either one to be a fairly reliable sign in the early diagnosis of gastric cancer.

Fifty cases were examined in this way, of which 17 were undoubted carcinoma. In 14 of the latter there was a positive reaction, and negative in 3. In 2 of these 3 cases the test was made only once. In this connection he draws the moral, however, that one should not be satisfied with one negative reaction. As regards the *x*-ray examination, carcinoma was shown to be present or suspected in every case.

Kayser quotes 3 cases in all of which there was no reaction, but in all there was the clinical diagnosis of cancer based on suspicious *x*-ray pictures. In 4 cases of achylia gastrica the *x*-ray and chemical examinations coincided except in one case, when the tryptophan test was positive. This is explained by Kayser as being one of those rare instances described by Neubauer and Fischer, when tryptophan was already existent in the stomach. In 15 cases of ulcer there were negative findings with both methods.

Kayser's conclusions are:

1. The diagnosis of gastric carcinoma is rendered much easier by the *x*-ray examination and the tryptophan test.
2. All cases diagnosticated in this way were advanced cases, and it is impossible to say just what results can be obtained with incipient cancer.

¹ Canadian Medical Association Journal, April, 1912, p. 287.

² Deutsch. med. Woch., 1912, p. 551.

3. A positive tryptophan reaction strengthens the diagnosis of carcinoma, but a negative test does not exclude malignancy.

Weinstein, as noted in *PROGRESSIVE MEDICINE* for last December, showed that the use of glycyL-tryptophan is superfluous for the detection of a tryptophan producing enzyme in the gastric contents. Gastric contents always contain proteoses and peptones which are easily hydrated by the cancer enzyme into simpler peptids and amino acids including tryptophan; so it would seem unnecessary to add glycyL-tryptophan, as simply testing for tryptophan would be sufficient.

Warfield¹ makes the criticism of Neubauer's and Fischer's test, that the saliva of some people when not acid to litmus, can decompose glycyL-tryptophan into glycine and tryptophan, and he concludes that swallowed alkaline saliva when mixed with neutral or faintly acid gastric juice, gives to the latter the power of producing tryptophan from glycyL-tryptophan. He says, by virtue of this, the test is of no value in cancer of the stomach.

In a subsequent paper, Weinstein² publishes further data regarding his test. He confirms Warfield's findings, but says that saliva exerts no action whatever on tryptophan. Added experience convinces Weinstein that his reaction is never present in a non-cancerous case, although it is absent sometimes in undoubted carcinoma of the stomach. He is unable to say if it is a reliable sign of early cancer.

Some of the disadvantages of the test are its inconstancy from one meal to another, and the interference with it by regurgitation of intestinal contents into the stomach. His advice regarding the latter is: "The stomach contents should be withdrawn gently and also without any straining on the part of the patient," and he adds, "If we obtain a specimen of stomach contents with a greenish color, and which gives the chemical test for bile, the specimen should be discarded and another one secured." Occult blood does not interfere with the test, nor does free hydrochloric acid.

It seems to me that the above method of preventing the inflow of intestinal secretion described by Weinstein is very naive. In view of the difficulty attending tests for bile in the gastric contents (see Goodall under that heading), Weinstein is a little too sweeping in his suggestions regarding its detection. Is bile the only intestinal substance which interferes with the test? Would it not be advisable to test directly for intestinal ferments as an evidence of intestinal regurgitation? I think these suggestions might well be considered in the next paper by Weinstein.

His technique is to give the patient a meal of a glass of water, hot or cold, and very sweet, with some white bread, or toast or biscuit. (The Ewald meal is not suited to the test?) Milk may also be added,

¹ Bull. Johns Hopkins Hosp., 1911, xxii, p. 150.

² Journal of American Medical Association, 1911, lvii, p. 1420.

and the contents are extracted in about an hour. A full dinner with extraction after two to four hours also serves the purpose, but any substance which is likely to impart color to the contents, such as strong tea, coffee, strawberries, and tomatoes, should be omitted. A portion of the gastric contents is filtered and tested directly for tryptophan. If the test is positive, no further treatment is necessary. If negative the filtered or unfiltered contents, without the addition of any preservative, are kept in a thermostat for from twenty-four to forty-eight hours, and then tested again for tryptophan.

The Test for Tryptophan with Bromine Water. In completing the tryptophan test, filtered stomach-contents should be employed, using 6 to 7 c.c. This volume is treated with a few drops of 3 per cent. acetic acid, and then saturated bromine water is added drop by drop from a pipette. The appearance of a reddish-violet or rose-red color shows the presence of tryptophan. If after the addition of about 4 drops of bromine water the expected color does not appear, the mixture should be allowed to stand for about fifteen to twenty minutes, when the characteristic color may develop. If by the end of this time the rose color fails to show, then more bromine water should be slowly added, drop by drop, until the mixture becomes yellow, or until a rose red color is imparted. If a reddish color is produced, the mixture should be allowed to stand again, when the tinge may grow deeper. Practice is needed, as a slight excess of bromine may make the characteristic color indistinguishable. Excess of bromine imparts a lemon-yellow color to this mixture. Whenever the reddish color merges into a yellow, we know positively that there is an excess of bromine in the mixture. The mixture should be well shaken after each addition.

An article containing a good bibliography, and reporting on comparative studies with the glycyl-tryptophan and tryptophan test is published by Saylor and Rosenbloom.¹ They take issue with Weinstein on the matter of action of the salivary peptidase on tryptophan, claiming that it vitiates the test the same as it does the original test. They agree that the use of glycyl-tryptophan is unnecessary, but they do not believe that the tryptophan test is a reliable one for gastric carcinoma.

Hirschberg² begins his article by saying: "Ever since the Neubauer and Fischer method of diagnosis in cancer of the stomach was displaced (?) by the plain tryptophan test, etc." One cannot help but feel that the author had in his mind condemned the original method long before the article was written, for he says, "It is unprofitable to waste time with the discredited Neubauer-Fischer method." This is not a wise stand to take at the onset of a work, as it precludes any broad view of the subject. The caliber of Hirschberg's work may be

¹ Archives of Internal Medicine, 1912, ix, p. 445.

² Medical Record, 1911, lxxx, p. 1324.

gauged when he bases his enthusiastic allegiance to the tryptophan test of Weinstein on one (?) positive cancer case and on 21 other patients with various gastro-intestinal symptoms.

Breisacher,¹ having studied the Weinstein test in 23 non-carcinomatous cases, and having found it present in 34 per cent., does not place as high estimate on its value as does its author, while Smithies² is quite convinced of the advantage of the method.

It may be deduced from the reading of these articles, that this test, like every other so far reported, attracts supporters and detractors and it must remain for "Time, the corrector where our judgments err," to give us the proper viewpoint.

Austin³ reviews the "Chemical and Biological Aids Used in the Early Diagnosis of Gastric Cancer," and concludes that so far as we are able to determine at present, the secretion of a malignant growth does not contain any peculiarity in its protein content by which it may be designated as such, and until such peculiarities are found, we are obliged to rely wholly upon its contained ferment, which, as has been stated, does not differ from the proteolytic ferment of pancreatic juice. Austin believes the tryptophan test is the most available, although he has more faith in its absence, as a means of excluding malignant disease of the stomach, than in its presence as demonstrating this condition.

The value of Salkowski's test for colloidal nitrogen in carcinoma receives confirmation from Einhorn⁴ and his co-workers.

DIFFERENTIAL DIAGNOSIS BETWEEN CANCER AND ULCER OF THE STOMACH. It may be very difficult to differentiate between chronic gastric ulcer and carcinoma. Schilling⁵ offers a case in point, where at operation the stomach was resected for a very large tumor in the lesser curvature which later was shown to be a fibrous connective-tissue growth. He calls attention to the fact that syphilis and tuberculosis are often the cause of supposed malignant disease, also quotes a case where the stomach was the seat of fibrous induration, for which an operation had been performed.

The x-ray is supposed by Haudek⁶ to be of assistance in diagnosing between the two conditions. His opinion regarding the value of this method has apparently changed, as it was only the year previous that he expressed himself as regarding the x-ray diagnosis of cancer or ulcer as secondary to other means at our disposal. Haudek has observed certain changes in motility in carcinoma and ulceration, and

¹ American Journal of Gastro-enterology, 1912, i, p. 11.

² Journal of American Medical Association, 1912, lviii, p. 1008.

³ Medical Record, 1911, lxxx, p. 371.

⁴ Archiv f. Verdauungskrankheiten, 1911, xvii, p. 557.

⁵ Journal of American Medical Association, 1911, lvii, p. 1174.

⁶ Wien. klin. Woch., 1912, p. 67.

he believes a study of these variations from normal may result in the possession of a new diagnostic sign. He gives the patient a bismuth meal, and after six hours a picture is taken. In stenosis due to carcinoma, the shadow is an irregular zigzag line; while in that due to ulcer, the pylorus is sharply demarcated. He says that malignant degeneration of an ulcer cannot be recognized, nor can one distinguish between a simple ulcer and carcinoma. Of other signs, he says a palpable tumor is the most important.

I feel that Haudek has not offered much of value. If one should defer a diagnosis until a tumor is felt, one will accomplish little through operative procedures. The diagnosis must be made before this, and nothing but research directed toward this end is of vital importance. The diagnosis between a benign and a malignant stenosis is facilitated, to be sure, by an *x*-ray examination, as Pfahler has shown, but clinicians are crying for an earlier diagnosis than can be made by this means.

Although a skiagrapher, Schmieden¹ insists that the *x*-ray does not render the other methods of examination unnecessary, but that palpation, gastric chemistry, and the Röntgen ray go hand in hand. It may be that at one time one or another shed most light on the condition, but none should be neglected. In contradistinction to Haudek, Schmieden believes that the *x*-ray is able to detect a tumor before it can be felt, and if this is so, his paper is an important contribution. Tumors of the lesser curvature and cardiac end, also contracted stomachs resulting from tumors, are all recognizable early, and he claims he has detected also a non-palpable tumor of the pylorus. Only in exceptional cases has an exploratory operation revealed a tumor which was not diagnosticated by *x*-ray. This article which is most complete and illustrated by 42 cuts, should be read in the original, as it lends itself but poorly to a review. It may be mentioned here that Schmieden dismisses the idea of diagnosticating ulcer by retention of bismuth in the excavation as impracticable. (See Alder and Ashbury under *X-ray Diagnosis of Gastric Ulcer*.)

Gastric Hemorrhage. GASTRIC HEMORRHAGE AS AN EARLY SIGN OF TOXEMIA. Jacobson and Post² call attention to gastric or intestinal hemorrhage as an early manifestation of a general toxemia. I think their conclusions are somewhat hastily formed, as in none of their cases was there autopsy *in vivo* or post mortem, and it is somewhat difficult to accept their statement *sine gran salis*, since we know that hemorrhagic erosions are by no means uncommon. This cause of the hemorrhage seems to me to have preference over a purely hypothetical conjecture.

GASTRIC HEMORRHAGE OCCURRING IN PROSTATIC HYPERTROPHY. Bouchut and Magdinier³ report an instructive case of gastro-intestinal

¹ Archiv f. klin. Chir., 1911, xevi, p. 253.

² American Journal of Medical Science, 1912, cxliii, p. 339

³ Lyon Médical, 1911, cxvi, p. 1104.

hemorrhage which occurred in a man with enlarged prostate, and which assumed such an appearance that it simulated cancer of the stomach. The patient suffered from prostatic hypertrophy with resulting pyelonephritis. Typical gastro-intestinal symptoms, such as are encountered in uremic states, presented themselves, and, in addition, there was vomiting of black blood and persistent melena. At autopsy, the cause of the intestinal hemorrhages was found to be existent in numerous ulcerations of the ileum. The hematemesis, the authors believe to be due to ulceration in the walls of the capillaries, coupled with vasodilatation due to the uremic state. There was no visible ulceration of the gastric mucosa.

HEMORRHAGIC EROSIONS OF THE STOMACH (EINHORN'S DISEASE). Apart from the erosions seen in certain toxic states and in many diseases of the stomach, there is one type which has aroused especial interest, namely, the chronic recurring erosion called more frequently Einhorn's disease. The symptoms, as given by Einhorn in 1894, are diffuse pain in the stomach coming on shortly after eating, but not influenced by pressure, vomiting, or eating again; great weakness; rapid loss of weight; erosions in the wash water from the fasting stomach. Some hold with Einhorn that this is a distinct clinical entity, while others believe the whole trouble is caused by chronic gastritis.

Jones¹ reports a case which is unique inasmuch as it is the first case which has been observed clinically and at autopsy. The patient was a male, aged fifty-seven years, who twenty years ago began to have, with the coming of each winter, attacks of diffuse burning pain in the stomach, especially after eating, but sometimes on arising. With them was also pallor, rapidly progressing weakness, and loss of weight. All foods seemed to cause distress, and there was some nausea and vomiting. There was no tenderness in the abdomen. Bowels were regular. With the onset of warm weather, he regained his health. Death seemed to be due to exhaustion.

Of the autopsy record, which makes this case of great value, I am reproducing the main features: "Stomach of normal size, blanched, and contained a little turbid fluid. Over the mucosal surface a moderate amount of grayish, somewhat blood-stained, tenacious mucus was found. On the posterior wall, about midway between the cardia and the pylorus, were seen five small eroded areas with hemorrhagic margins and bases. They were superficial in character, not extending to the submucosa, and varied from the size of a split pea to 1.5 cm. in length and $\frac{1}{3}$ cm. in width. No eroded vessels could be found."

The microscopic picture differed from that seen in chronic gastritis, inasmuch as there was an entire absence of proliferation of connective-tissue elements; there was engorgement of the superficial blood capillaries and distention of gland cells by round-cell infiltration. It would

¹ Journal of American Medical Association, 1911, lvii, p. 1265.

seem from a study of this case that Elsnor's belief that Einhorn's disease is but a form of ordinary gastritis is not well founded. Furthermore, Jones does not agree with Einhorn's view that it is *not* a form of gastritis, for Jones believes it is, and he describes it as a chronic non-proliferative hemorrhagic gastritis.

PARENCHYMATOUS HEMORRHAGE FROM STOMACH AND INTESTINE. Some instructive cases of massive hemorrhage from the stomach and bowel, but with negative postmortem findings, are reported by von Czyhlarz.¹ He was able absolutely to exclude any etiological factor as heart, liver, or pulmonary disease, etc., and although he regrets that the pathogenesis is so obscure, yet he leaves us no nearer the truth.

Gastric Dilatation. ACUTE DILATATION OF THE STOMACH. Mathieu,² in an able article devoted to this subject, paints the clinical picture as follows: "There is enormous distention of the stomach, which shows itself by bulging in the upper part of the abdomen with increased tympany, by an accumulation of large quantities of fluid in the stomach recognized by a succussion splash, and by profuse vomiting. Patients not infrequently vomit as much as 3 to 4 liters of fluid in the course of the day. At the same time there is intense thirst, the patient's body is covered with a cold sweat, the whole appearance is one of considerable anxiety. The pulse is small, running, irregular, and intermittent, and death may result in twenty-four or thirty-six hours, or as late as two or three days. Cases are on record in which death occurred at the end of the tenth or twelfth day."

In the majority of the cases the gastric distention begins from one to three days after operation, although it may supervene during the operation, necessitating the discontinuance of the latter. There is no escape of gas or of fecal matter from the anus, and this often leads to the common but serious mistake of diagnosing the condition as acute intestinal obstruction. The vomitus contains bile, never hydrochloric acid, sometimes acids of fermentation, and always hydrogen sulphide. Not infrequently the vomitus is black, looking like blood, but in the majority of cases this appearance is due to bile, although blood may also be present, due to erosions of the gastric mucous membrane. Bile and pancreatic juice are always present as a result of occlusion of the duodenum.

The postmortem findings consist of an enormous dilatation of the stomach and a very considerable dilatation of the terminal portion of the duodenum, where it is crossed by the superior mesenteric artery. Mathieu pertinently queries, Which is the primary factor? Is it the gastric or the duodenal dilatation?

It may be *à propos* to say that one view is that the weight of the

¹ Archiv f. Verdauungskrankheiten, 1912, xviii, p. 85.

² Arch. d. Mal. d. l'App. Dig., 1911, v, p. 409.

intestine causes a pinching of the mesentery which, in turn, produces a constriction of the duodenum. Those who hold this supposititious view, support it by offering new hypotheses, namely, a certain anatomical predisposition, to wit, undue length of the mesentery, ptosis, scoliosis, all of which would explain satisfactorily the dropping of the intestine, its traction on the mesentery, and the constriction of the duodenum by the superior mesenteric artery.

Mathieu can scarcely understand how the weight of the intestine can cause enough traction to bring about the condition, for experimentally it has been demonstrated that more weight is required than that afforded by the mass of intestines. He believes the gastric dilatation is primal. In order to understand his theory, I have reproduced two of his cuts. In the first the anatomical relations are diagrammatically depicted:

A represents the aorta; *AMS*, the superior mesenteric artery; *D*, the duodenum in the neighborhood of the artery; *E*, the stomach; *I*, the intestine, and *M*, the mesentery.

When the stomach is greatly distended, it is prevented from going up or forward by the diaphragm and by the anterior abdominal wall respectively. It descends, therefore, compressing the intestine and causing a pull on the superior mesenteric artery which strangles the duodenum like a cord (see Fig. 5). This theory receives confirmation at the necropsy table and in the experimental laboratory, and surely seems more probable than the hypothesis mentioned above, but what causes the gastric dilatation?

The view of a general peritonitis bringing about paralysis of the stomach with distention is scarcely well founded, as there is rarely any associated clinical phenomena of this condition, and postmortem examinations have not revealed any existence of inflammation. Shock following operation on the abdominal organs has been held accountable, but the condition arises where the peritoneum has not been opened, as in operations on the kidney and spinal cord. It has been observed that more cases occur after the use of chloroform than after ether, but narcosis can have but little bearing, since acute dilatation arises in purely medical cases.

Mathieu believes that the *aërophagia* theory of Lardennois, propounded in 1909, is the most probable, and he corroborates this author's findings in 7 cases by finding similar phenomena in a case of his own which he describes in some detail. His explanation of the mechanism of *aërophagia* contains nothing new, so I have thought it futile to reproduce it. From the standpoint of treatment, Mathieu believes that there is not only an active but also a prophylactic means.

Surveillance of patients who have been operated upon should be rigid, as *aërophagia* is common in these subjects. The throat is irritated by the chloroform, there is much mucus in the mouth, the

tongue is dry, and they are constantly swallowing to overcome these annoying postoperative features. The author believes that tying a string about the neck will call attention to deglutition, hence prevent it to a certain extent, and that a cork held between the teeth is also a useful measure. Of active treatment, lavage and the ventral decubitus are the most important.

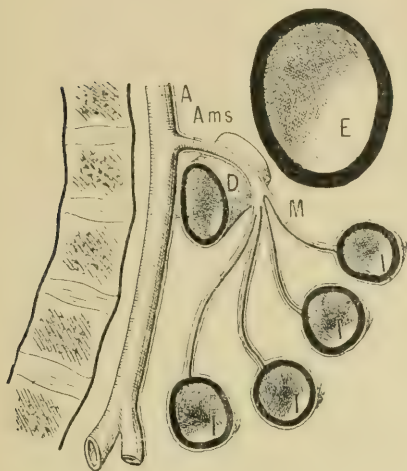


FIG. 4.—Mathieu.

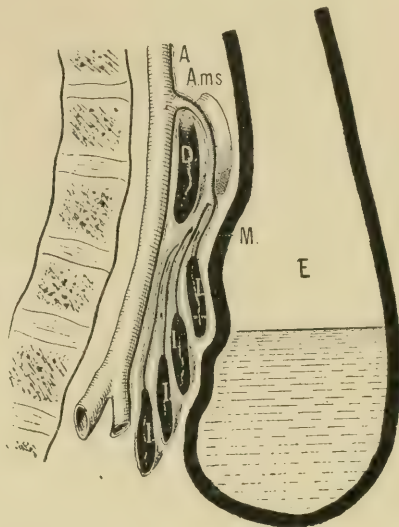


FIG. 5.—Mathieu.

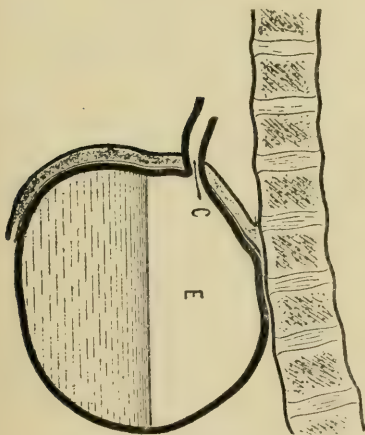


FIG. 6.—Mathieu.

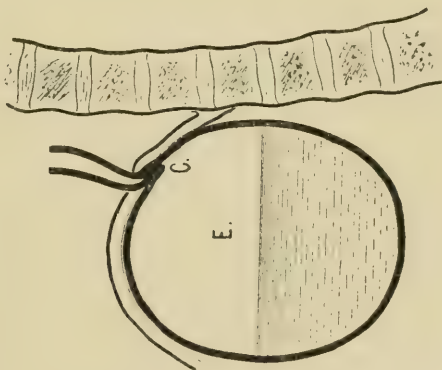


FIG. 7.—Mathieu.

The mechanism of the last named is shown by studying the two cuts from Mathieu's article. In Fig. 6 the cardiac end (*C*) of the stomach (*E*) is closed by accumulation of gas. In Fig. 7 the effect of lying on the stomach is illustrated.

Box and Wallace¹ report 6 cases and offer a theory which is very much like that of Mathieu, namely, that the gastric dilatation is primary, and that the duodenal constriction is caused by the weight of the superincumbent stomach. They do not mention the cause of the original dilatation, an unwarranted omission, to my mind.

Lyle² reports an interesting case occurring after an operation for hernia, during which operation a large portion of omentum, which had descended with the hernia, was resected. The acute dilatation began one hour after the operation (local anesthesia was used) and Lyle believes that the removal of the omentum in such bulk profoundly altered the circulation and possibly the nervous mechanism of the stomach, thus causing a temporary muscular paralysis. Under most active treatment recovery was complete.

That *acute dilatation of the stomach* is a real danger in *pneumonia*, is amply shown by Fussell³ in a report of 5 cases occurring in his own practice, with a collection of 6 cases from literature. That it is a most serious condition is unfortunately too well exemplified by 6 deaths out of the 11 cases. The symptoms and physical signs are as follows: vomiting, abdominal pain, abdominal distention (due to enlarged stomach), constipation (diarrhea in a few cases), collapse, splashing sounds, peristaltic movements over the stomach.

Fussell takes up these signs in detail, and, inasmuch as he is the first to report this complication of pneumonia, I am abstracting his article at some length.

1. *Vomiting*. This is the most frequent symptom, as it occurred in all but one of the above 11 cases. The vomitus was yellowish in 2 instances; in 2, dark greenish or blackish in appearance. The quantity expelled was usually large, one pint or more, and vomiting was painless, like that of general peritonitis.

2. Pain occurred but twice, and the infrequency of the symptom is accounted for by delirium which was present in most cases.

3. Abdominal distention usually occurs quickly, is frequently severe, and is almost without exception in the epigastrium, causing a tumor in that position, but, on account of the distention being due to the large stomach, and the stomach occupying an abnormal position, the whole abdomen is distended. In one case the outline of the greatly distended stomach could be seen, and in every case it disappeared completely after lavage.

4. Constipation is the rule, although in two cases there was diarrhea.

5. Collapse is common, and the appearance of the patient is that of almost immediate dissolution.

6. The splashing sounds are elicited by placing one's hands upon

¹ Lancet, July 22, 1911, p. 214.

² New York Medical Journal, 1911, xciv, p. 932.

³ American Journal of the Medical Sciences, 1911, New Series, cxlii, p. 794.

the lower abdomen and making a quick percussion of the portion of the abdomen occupied by the tumor. Peristaltic movements of the stomach area can occasionally be seen, but are a rare phenomenon.

The *treatment* depends on early diagnosis, and sudden abdominal distention occurring in the course of pneumonia should immediately put the attending physician on his guard. Often before the diagnosis can be made with certainty a stomach tube must be introduced and lavage practised. If the contents of the stomach are foul and copious, or if there is much flatus, relief will be almost instantaneous, and if the dilatation follows the crisis, recovery may be confidently expected. Lavage must be performed as often as the distention recurs. Even collapse, with a running pulse, is no contraindication. The mechanical obstruction resulting from distention is largely removed by turning the patient on the right side or on the face. All food and drink by mouth must be discontinued. In 2 of Fussell's cases, strychnine and eserine hypodermically have seemed of value.

Leriche and Blanc-Perduet¹ report a case of intestinal obstruction caused by the mesenteric artery, with subsequent dilatation of the stomach.

Gastric Neuroses. Kaufmann² emphasizes that functional disorders and neuroses of the stomach are not identical, and he is not in favor of attributing all gastric symptoms, for which no organic lesion can be held responsible, to a neurosis. He urges careful investigation for a primary disorder, such as disease of the gall-bladder and appendix, diseases of the heart, arteries, kidneys, liver, pancreas, intestines, pelvic organs, central nervous system, systemic diseases, etc. After having ruled out all functional disorders due to organic diseases, either of the stomach or of other organs, there remains as deserving the denomination "neurosis" only that group usually called primary or genuine gastric neuroses. We may give them a definition by describing them as "functional disorders of the stomach caused by or associated with functional disorders of the nervous system." I am heartily in accord with this sermon of Kaufmann's, as I have been time and time again impressed with the rarity of hyperchlorhydria *sui generis*, and have been very much gratified by observing with what good results treatment is followed when directed toward removing the primary cause.

Greene³ believes the underlying conditions of a gastric neurosis are asthenia universalis chronica (by far the most frequent primary cause), chronic starvation, and pure psychoneurosis. He does not lay emphasis upon searching for an organic lesion before the diagnosis of neurosis is decided upon, as does Kaufmann, but undoubtedly this point is not overlooked by Greene in his practice. The present paper is devoted

¹ Arch. d. Mal. d. l'App. Dig., 1911, v, 674.

² New York Medical Journal, 1912, p. 417.

³ Journal American Medical Association, 1911, lvii, p 2060.

essentially to the discussion of treatment, and the basis of this is psychotherapy. These cases bear surgical interference badly, and operation should never be recommended.

In an abstract in the *Journal of the American Medical Association* (1912, lviii, p. 234), Murri cites an instance of what he is pleased to call a gastric neurosis. I feel he is taking great liberties with the nomenclature, and that his case clearly shows disturbance of metabolism (acetonuria), and also some cardiac disturbance (tachycardia, arrhythmia). Indeed the symptoms as given in the abstract might be caused by Graves' disease, for we have a history of business and family worries, irritability of the nervous system, tachycardia, neurasthenia, slightly abnormal temperature, anorexia, and defective digestion. It is cases of this kind which lead to confusion, inasmuch as the etiological factor behind the symptoms point definitely away from the neurosis theory.

Atony of the Stomach. My inability to read Faber's article in the original necessitates the quoting of its review which appeared in the *Journal of the American Medical Association*, 1912, lviii, p. 600. Faber reviews the literature and the various theories in regard to motor insufficiency and dilatation of the stomach resulting from atony. He gives in this article an analysis of 259 cases of chronic dyspepsia, 29 of gastric cancer, 88 of ulcer of the stomach or duodenum, and 94 of gastritis. 560 cases including 70 with evidences of gastropptosis were studied from the standpoint of the motor function of the stomach, the material showing that chronic atonic insufficiency and chronic atonic dilatation may occur together, but are not necessarily associated. The insufficiency is due to defective functioning of the lesser curvature which does most of the active mechanical work of the stomach. The greater curvature is more passive, and the musculature is undernourished, and weakens and stretches. He protests against the term gastropptosis, as the whole stomach does not sag. The greater curvature merely stretches lengthwise and sags low, but the cardia and pylorus remain at the normal levels. The whole trouble in atony of the stomach is, he insists, the result of weakness of the nerves with, or in consequence of, lack of sufficient nourishment. He rejects Stiller's assumption of a congenital asthenia of the stomach, as under appropriate tonic, physical and dietetic measures, extra nourishing food, out-of-door life, and measures to cure insomnia, the digestion and assimilation are restored to normal and all the signs of gastropptosis gradually disappear. Dyspeptics grow nervous, and this may lead to loss of appetite or vomiting, or both. He says of atony with acute dilatation, that it probably occurs with unsuspected frequency after errors in diet, but usually rights itself spontaneously. He does not agree with Tissier in regarding swallowing of air as such an important factor in acute postoperative dilatation, but ascribes the latter to a paralyzing action from the anesthetic.

Maclaren and Dougherty¹ believe that gastric atony is the cause of the first symptom of neurasthenia, and in the main agree with the views of Faber extracted above. They also refute Stiller's theory for the same reason that Faber does, namely, the ease with which subjects can be cured. The proper treatment is medical, as operations on the atonic stomach have still to be proved advisable.

Abnormally Small Stomach. We have been accustomed for so long to hear of enlargements of the stomach, that work directed toward the diagnosis of the unusually small stomach (microgastria) is most refreshing in its rarity. An important monograph was published five years ago by Jonas, in the *Archiv f. Verdauungskrankheiten*, 1907, xiii, p. 691, but since then but little has been reported. Glénard and Jangeas² have taken up the subject anew and describe some very interesting features. Their paper includes a study of the different forms of small stomach from the standpoint of the skiagraph.

They define their position regarding a normal stomach, and agree with most observers that the lowermost border is about 2 cm. above the iliac crests, and that, normally, there is a small air chamber and a high bismuth shadow. They claim, however, that a stomach can be regarded as normal even if all dimensions are below the average. All examinations were made with the patient standing, for it is in this position that fewer errors arise, errors which may, collectively or singly, give rise to the diagnosis of "false little stomach." Bismuth sometimes does not delineate the contours of the stomach, and if the bismuth is prevented from reaching the lowermost boundaries of the stomach by a tumor, there will be a smaller shadow, although the stomach is really larger. Another confusing condition is that of biloculated stomach, of which he gives two illustrations. The second picture was taken several days after the first, and shows that the shadow obtained in the latter was caused by the bismuth stopping in the upper of the two loculations. Glénard and Jangeas divide small stomachs into three classes:

1. Those rigid, retracted, and with general insufficiency of the pylorus.

2. Those deformed (cicatrices, adhesions, compressions, gastro-enterostomy).

3. Those with hypermobility and compensating hypertrophy in pyloric stenosis.

From the standpoint of the clinician who desires some symptom-complex whereby he will be enabled to diagnosticate or to suspect the condition without the aid of the x-ray, this paper is unsatisfactory. It is of great importance, however, as it brings to our attention a subject little dignified by papers. The diagnosis of the small stomach can only

¹ Annals of Surgery, 1911, liv, p. 306.

² Arch. d. Mal. d. l'App. Dig., April, 1912, p. 196.

be made by means of the x -rays. During the perusal of this article I had looked for some mention of the *congenitally* small stomach by the authors, but they leave it an open question and forbear to discuss it.

Phlegmonous Gastritis. By this term is understood a purulent inflammation of the wall of the stomach beginning in the submucosa and extending to the muscularis, subserosa and serosa (Riegel). According to the etiology, two groups may be differentiated:

1. Primary, or idiopathic phlegmon.
2. Secondary phlegmon.
 - (a) By continuity, esophagitis.
 - (b) After ulcer, carcinoma or operation.
 - (c) Metastatic, arising from a form of infection somewhere in the body.

According to the pathology, there are two forms also: (1) the diffuse phlegmonous gastritis, (2) circumscribed phlegmonous gastritis, abscess of the stomach.

With these preparatory remarks, Bossart¹ introduces the description of a case. There is a good historical review and apparently a complete literary reference, but after reading the article most carefully I learned that the only suggestion for the diagnosis of the condition is "motor unrest of the patient, with this peculiarity, that motion does not increase the pain." No other sign or symptom is mentioned which might be regarded as typical of phlegmonous gastritis, and we finished Bossart's paper with a feeling that we had been intellectually improved, but the patient who perchance might consult us about his gastric pain —?

An abstract of Jensen's article in the *Journal of the American Medical Association*, 1911, lvii, p. 520, gives one a different idea of the disease from that gathered from a reading of the article reviewed above, and I quote from it extensively.

Jensen has collected 121 cases reported in literature, and adds detailed histories of 10 additional cases. Contrary to Bossart, he claims that the diagnosis has been made in a constantly larger porportion of cases than used to be possible. Conditions which have been wrongly diagnosed are typhoid fever, meningitis, erysipelas, and septicemia. The gastric symptoms usually predominate, the vomiting being more incessant and violent than in any other affection. The vomit may be purulent, and it was this that gave the clue in Leube's case. There is not so much systemic disturbance or such high fever with other stomach affections likely to be confounded with it: The pain is intense and is intermittent. At first the pain, tenderness, and spasm are located above the umbilicus, but gradually spread downward as the peritoneum becomes involved. In one of Jensen's cases the local pain was limited to the gall-bladder, radiating to the epigastrium, but there was absence

¹Correspondenz-Blatt f. Schweizer Aerzte, 1912, xlii, 176.

of jaundice. The frequent eructations and hiccough, in connection with the slight tenderness and severe general disturbances, suggested more a uteroperitoneal lesion.

The clinical picture very strongly resembles that of subphrenic peritonitis following perforation of a gastric ulcer. Acute hemorrhagic pancreatitis is somewhat similar, symptomatically, but is seldom accompanied by such high fever as is phlegmonous gastritis.

As far as prognosis is concerned, the patient may die during the first two or three days, or there may be a remission of symptoms until the fatal peritonitis develops. Seven writers have reported recovery after purulent vomiting, but Jensen's 10 Danish cases all terminated fatally in from forty hours to eleven days. Mikulicz operated successfully in one case, also Bovée in a woman near term, while a number of operative attempts are on record. In several of the Danish cases the finding of circumscribed peritonitis at necropsy showed that operative intervention in time might have saved the patients—they die on the fifth or eighth day. In 2 of his cases there was cancer of the stomach, and the gastritis developed suddenly after introduction of a stomach tube. In another the sound had been introduced to aid in feeding an insane woman, and this was followed at once by the signs of purulent gastritis, with death in two days.

Benign Tumor of the Stomach. Ballock,¹ in reporting a doubtful case of fibroma (sarcoma ?) of the stomach, says the main diagnostic criterion in benign growths of the stomach is the great mobility of the tumor. He says they may be moved anywhere in the abdomen, but since this is also a feature of neoplasms of the intestine and omentum, it is not necessarily a distinct feature of innocuous tumors of the stomach.

Syphilis of the Stomach. Mathieu² gives an historical review of syphilitic lesions of the stomach, from Andral's 2 cases in 1838 to date, citing in particular from Fournier's work on syphilis of the stomach in which there were described two cases of "false cancer of the stomach;" a tentative course of mercurial treatment was almost *casually* instituted before the contemplated operation to remove the tumor palpated in the stomach, and in a few months all trace of the "cancer" had disappeared. In other cases the syphilitic lesions simulated cancerous stenosis at the pylorus, or induced ulceration or changes in the stomach which resulted in hour-glass stomach. In one of the cases cited, the pylorus was resected before the syphilitic nature of the lesion was ascertained. In other instances the syphilitic stenosis at the pylorus continued to progress notwithstanding vigorous antisypilitic measures. In another case an actress with a history of syphilis had apparently a hemorrhagic gastric ulcer, rebellious to ordinary measures but healing at once under

¹ Southern Medical Journal, 1912, p. 180.

² Abstract in Journal of American Medical Association, 1911, lvii, p. 1415.

potassium iodide. The patient had a recurrence a few years later, while travelling, but no physician would heed her requests for anti-syphilitic treatment, and she used up nearly her last remnant of strength in travelling back to her former physician, who again banished all symptoms by vigorous use of potassium iodide. In another instance, a man was on the point of having an operation performed to relieve the disturbances from an hour-glass stomach, the change in shape apparently having come on gradually. A tentative course of antisyphilitic treatment induced striking improvement, and the stomach resumed more and more its normal shape. There was evidently gummatous induration in the stomach wall, shriveling and drawing it up at this point, and thus separating it into two parts. In every case of severe gastric disturbance in a patient suspected of syphilis, the possibility of a syphilitic origin should be borne in mind. The coincidence of tertiary lesions elsewhere should suggest a tentative course of specific treatment. Whether Mathieu does not mention it, or whether the writer of the abstract just quoted does not speak of it, I do not know, but I should think, in view of Mathieu's findings, that a routine Wassermann examination in certain types of gastric diseases might be a not valueless suggestion.

An article by Moren on the same subject appears in the *Kentucky Medical Journal*, July 15, 1911.

Actinomycosis of the Stomach. Mayo-Robson¹ reports a case in a woman, aged sixty years, who began to have pain and discomfort in the upper abdomen, accompanied with loss of flesh. Her appetite was poor, and indigestion was complained of. Six months before operation, eighty-five months after the above symptoms appeared, a tumor presented itself in the epigastrium. Five months later Mayo-Robson saw the patient for the first time and found the epigastrium to be occupied by a tumor which extended across the middle line on both sides, the bulk being in the left, extending upward beneath the left costal arch. The skin over the tumor was thickened and edematous, and the abdominal tumor appeared to be adherent to the anterior abdominal wall. The temperature was normal.

For a time following the operation the patient was much improved, but died five months later.

Endothelioma of the stomach. A case of endothelioma of the stomach, making the fifth on record, is reported by Bagger-Jørgensen.²

Sarcoma of the Stomach. Sarcoma occurring, according to recent statistics of Wild, Gurlt, Tilger, Donath, Haberkant, Yates, and Lexer, in but 1 per cent., or at the most, 2 per cent. of cases, is an unusual condition. Hesse³ reports a case which has the added feature

¹ Surgery, Gynecology, and Obstetrics, 1911, xiii, p. 491.

² Beit. z. klin. Chir., 1911, lxxiii, p. 305.

³ Therapie d. Gegenwart., 1911, p. 250.

that the patient was in good health seven and one-half years following resection of about two-thirds of the stomach. Gosset,¹ in reporting his case, found in the literature 171 cases, 21 of which had been overlooked by Zesas,² or had been published since his monograph appeared. Gosset's patient, on whom a gastrectomy was done, was observed until a month and a half after operation, and at that time was doing well.

Sarcoma of the stomach may be classified as follows:

1. Tumor infiltrating the wall of the stomach but limited in extent.
2. Multiple nodular tumors scattered throughout the stomach wall.
3. Tumor infiltrating uniformly the entire stomach.
4. Large and indurated or sessile tumor, attached to the stomach in a limited area and growing without the stomach. This fourth type is typical of sarcoma, while the appearance of the first three are seen also in cancer.

Metastasis is not as frequently seen as in carcinoma, but when it does occur, secondary growths are seen in the liver and in the neighboring glands, the mesenteric glands, in the kidneys, ovaries, lungs, and skin. The diagnosis is rarely made clinically, as the condition is so infrequent that one does not bear it in mind. There are no symptoms by which the nature of the tumor can be determined before autopsy *in vivo* or postmortem.

Action of Narcosis on the Stomach. Mangold³ has performed some interesting experiments on birds during ether narcosis, and has found there was relaxation of the musculature at the same time the voluntary muscles lost their sensation and motion. The action of ether seems to be on the central nervous system. This paper has a practical bearing as it throws some doubt on those experiments done on narcotized dogs, where the motility of the stomach has been studied, as in the latter case no regard whatever has been paid to the action the ether or chloroform might exert on the gastric mechanism.

DISEASES OF THE INTESTINES

Duodenal Ulcer. It is but fitting that the *place d'honneur* should be given to Mr. Moynihan⁴ when the subject of duodenal ulcer is discussed. In the paper which I am about to abstract, this distinguished surgeon calls attention to an article of two years ago, wherein the characteristic symptoms were enumerated, and which was reviewed at length in *PROGRESSIVE MEDICINE* for 1910, page 94. In this paper

¹ Presse Méd., 1912, p. 221.

² Sammlung klin. Vorträge (Chirurgie), 1911, p. 417.

³ Münch. med. Woch., 1911, p. 1861.

⁴ Lancet, January 6, 1912, p. 9.

he laid special emphasis on the history in the diagnosis, and he repeats today that the anamnesis, "if considered in *all* its details, is so characteristic that a diagnosis of duodenal ulcer based solely upon it will very rarely prove inaccurate when the parts are examined at the time of operation. I emphasized also the fact that the duodenal ulcer, whose presence had been predicted upon the strength of the history alone, could be demonstrated to the conviction of all, that the ulcer was a real and not a fanciful thing." He further says that the chief criticism which was levelled at that paper was that the disease picture did not differ from those cases which had been recognized by generations of physicians as "acid gastritis" or "hyperchlorhydria."

Moynihan was not slow in recognizing this similarity, but he soon found that cases of hyperchlorhydria were really cases of duodenal ulcer, and that free HCl was not present in excess in the majority of cases. He says in about 40 per cent. free HCl is approximately normal, in 40 per cent. it is in excess, and in 20 per cent. it is below normal. His views on hyperchlorhydria are:

"Hyperchlorhydria, a term which has been debased and shorn of its original significance, should not be used in a clinical sense, but should be held strictly to indicate the excess of active hydrochloric acid in the stomach contents. Hyperchlorhydria is present in most cases of duodenal ulcer during the active stage of ulceration. There may be hypochlorhydria in cases of duodenal stenosis; in the intervals between 'attacks;' or, rarely, in the acute phases of ulceration. There are possibly geographical differences in the frequency and severity of hyperchlorhydria in cases both of duodenal and of gastric ulcer. Hyperchlorhydria is present in other diseases, notably cholelithiasis and appendicitis, and its presence probably explains the mimicry of the symptoms of duodenal ulcer by these various diseases. The persistent presence of an excess of active hydrochloric acid in the stomach-contents is indicative of an organic rather than a functional disorder."

The x-ray examination is valuable as a diagnostic aid, for, in cases of duodenal ulcer in which there is no stenosis, a most striking spectacle is afforded by the greatly increased activity of the stomach. Food begins to pass into the duodenum at once, and continues to pass with greater rapidity than in the normal condition. By the time the pain begins to appear the stomach is nearly empty, and most of the bismuth has left the duodenum, through which it shoots rapidly and can be seen in the small intestine. The muscular activity of the pyloric portion of the stomach is exalted, but in a few cases there is a local unrest in the first portion of the duodenum. Occult blood is generally present, and is an important sign.

Four cardinal signs, then, indicate a duodenal ulcer:

1. The anamnesis.
2. Increased secretion of free HCl during the attacks.

3. *X-ray picture, i. e.*, increased secretion or motor function of the duodenum.

4. Occult blood in the feces.

With characteristic slowness in accepting new ideas (especially those of foreign lands), the German clinicians have been tardy in the recognition of duodenal ulcer. The pendulum of their distrust in the entity of the lesion is swinging back to the side of acceptance of English and American ideas, and now our German colleagues are realizing that their slowness in diagnosing the disease was due to a woeful lack of keenness on their part. A very interesting discussion on duodenal ulcer was lately participated in by Ewald and Bier,¹ and their papers are worthy of careful perusal.

Ewald discusses the incidence and pathology of the condition, and then takes up the question of diagnosis, emphasizing the following features:

1. *Pain.* This is complained of in the median line or near the mammary line, and does not radiate to the back as in gastric ulcer. There are no dorsal points of tenderness. There is a certain periodicity of the attacks, which may occur after months of freedom from pain. Pain, when present, appears three to five hours after eating, and sometimes it seems to radiate to the right thigh. A striking feature is the immediate cessation on taking food. Ewald does not lay as much weight on hunger pain, which he believes he has seen in other conditions.

2. Hyperchlorhydria has been a frequent occurrence.

3. Vomiting is rare.

4. Occult blood in the feces, with no blood in the gastric contents, Ewald regards as one of the best diagnostic signs.

5. Vasomotor disturbances, cold hands and feet are common.

6. The Cammidge reaction has been held to be significant, but Ewald has not much faith in it.

7. Although he has not tried the thread test of Einhorn, he does not believe it is very useful.

8. *X-ray examination* is important, although he does not describe the phenomena as fully as does Moynihan.

In the diagnosis, Ewald lays special importance on the periodicity of the pain, the vasomotor phenomena, occult blood in the stools, and pylorospasm. The hunger pain is less important.

The treatment of acute cases is medical, and in other cases surgical.

Bier, like Ewald, calls attention to the relatively few number of cases reported by German clinicians, although he himself has had 23 in the last four and a half years in Berlin. "Why is it," he queries, "that duodenal ulcer is more frequent in America and England than in Germany? Is it because physicians there exaggerate, or is ulcer really more frequent, and must we Germans confess that we stand far behind

¹ Deutsch. med. Woch., 1912, pp. 785, 788, 836.

English and American clinicians as diagnosticians?" He says ulcer is very frequent, as Moynihan and Mayo have shown by *autopsia in vivo*, and he concludes that in Germany it occurs more frequently than it is diagnosticated.

One of the reasons for this is that the Germans have not differentiated gastric from duodenal ulceration. They speak of ulcer or stenosis pylori without any regard as to whether the ulcer or the stenosis is at the end of the stomach or at the beginning of the duodenum. Even at operation this is not enough regarded, and he pays a tribute to W. J. Mayo for having definitely shown where the pylorus is located. (This was described by Mayo, *Annals of Surgery*, 1907.)

Bier then, in somewhat caustic vein, speaks of the methods of German clinicians as being "too exact," that is, they seek out the most recondite methods of examination, and disregard the aphorism of Moynihan that "History is all, examination relatively nothing." He then discusses the anamnesis which is practically a repetition of what Moynihan has stated. Bier lays much importance on the x-ray picture which he says discloses a fringe-like process of bismuth, corresponding to the duodenum (stenosis?) and a dilatation of the duodenum just in front of the ulcer. These seem to me to be rather late evidences of ulceration, and indicate complications (stenosis). Moynihan insists that the diagnosis can be made before this stage. The position which German clinicians are occupying in regard to duodenal ulcer has evidently caused some disturbance of their equanimity as I find, in the *Münch. med. W'och.*, 1911, p. 2096, an appeal for the collection of all material pertaining to duodenal ulcer which is to be referred to a central bureau for the proper correlation. This "Aufruf" has been signed by the foremost clinicians of Germany, and should be productive of valuable results.

Statistics. Dietrich¹ has collected the postmortem statistics of one of the large hospitals from 1908 to 1911, and has found duodenal ulcer in 0.4 per cent. of the cases. Wille,² of Christiania, reports 6 cases occurring in his practice in one year, and states that signs of duodenal ulceration were found at necropsy in 7 of the 4100 cadavers examined during the last ten years at the Medical Hospital.

Rosenbach³ describes his findings in 56 cases of ulcer of the duodenum which occurred in a grand total of 14,479 autopsies from 1897 to 1910 (0.393 per cent.). He regards the condition as secondary to other diseases, or, to express it differently, as an associated condition in other diseases. These other diseases include changes in organs incidental to old age, cardiovascular and renal conditions, alcoholism appendicitis, and pyemia. Occasionally these ulcers show a tendency to heal spon-

¹ *Deutsch. med. W'och.*, 1912, p. 638.

² Abstract in *Journal of American Medical Association*, 1912, lviii, p. 73.

³ *Archiv f. Verdauungskrankheiten*, 1912, xviii, p. 48.

taneously, but this cicatrization rarely leads to stenosis. From the prognostic standpoint, duodenal ulcer is more serious than gastric ulcer, as there is less tendency to heal and also greater tendency to perforation on account of the thin intestinal wall.

Pewsner¹ found in 1627 autopsies in eleven years, 10 cases of duodenal ulcer (0.64 per cent.), and describes the symptomatology. Therapy should be the same as for gastric ulcer, and he advises the patient, after the completion of the cure, to follow a careful *modus vivendi et edendi* early, and to have his feces examined regularly for occult blood. The latter seems to me a most practical suggestion, as recurrences should be easily and early detected by so doing.

DIAGNOSIS OF DUODENUM ULCER. In the diagnosis, Willmoth² considers pain to be very characteristic, but does not agree with the "hunger pain" idea of Moynihan. His opinion regarding treatment is conservative, for he does not believe acute ulcer, in the absence of complications, should be treated surgically, nor should a chronic case be operated on until careful and prolonged medical treatment has failed to give relief.

Moullin³ has a very entertaining paper in which he attempts an explanation of the cardinal symptoms of duodenal ulcer. The cause of the pain has been generally held to be due to the acid gastric juice coming in contact with the raw surface of the ulcer, and that the reason alkalies give relief is because they neutralize acids. Moullin says that "it is impossible to think that in the case of a duodenal ulcer the dose of soda has had time to pass through a stomach half filled with semidigested food, and neutralize the contents of the duodenum beyond." He says the immediate cause is a violent spasmodic contraction of the unstriated muscular fiber at and near the pylorus. "If the contraction is comparatively moderate, so as merely to cause a certain degree of tension, there is only the sensation of fulness. When it is more severe the sensation becomes pain, which is described as bursting—a phrase, it may be noted, patients are very fond of using. It describes literally what they feel. In the worst cases this pain becomes almost unbearable, and leaves behind it when it subsides a feeling of soreness and tenderness that may last for days. If there is any mechanical obstruction the contraction comes on in waves, one succeeding another in regular sequence; but if the passage is free, except for spasm, and the stimulus is continuous, the contraction is maintained without intermission, until at last it gives way either because the muscular fibers are tired out or the nerve centre is exhausted.

"The immediate stimulus that starts this contraction is probably

¹ Archiv f. Verdauungskrankheiten, 1911, xvii, p. 562.

² Lancet-Clinic, 1912, p. 440.

³ Lancet, March 2, 1912, p. 563.

always the food as it leaves the stomach. At the beginning of digestion, as is well known, muscular action is comparatively slight. Later it increases in vigor as the stomach becomes empty, perhaps caused in some measure by the increased acidity of the contents. So long as the mucous membrane is normal and healthy, and there is no obstruction, spasmodic or mechanical, the contraction is not felt. It is absolutely imperceptible. But if from any cause the responsiveness of the mucous membrane to stimuli becomes abnormally raised, at once irregular spasmodic contraction sets in, in place of muscular action in orderly sequence, and with it, as its inevitable attendant, pain. There may be an ulcer or there may not. The presence of an ulcer is certainly not necessary. Muscular spasm may occur in its worst and most painful form without anything of the kind. All that the pain really indicates is that there is an irritable, hyper-responsive condition of the mucous membrane, so that a stimulus which in ordinary circumstances would produce only a normal result calls into play a reaction which is not only excessive in amount, but which persists and continues so long as this condition is present. If this goes on, if the spasm and contraction are kept up, it ends in the establishment of a typical vicious circle, the increased responsiveness of the mucous membrane intensifying the muscular spasm and the increased muscular spasm irritating the mucous membrane still more by crushing the tender surfaces together. It is the formation of this vicious circle that holds the secret not only of the symptoms that are present in what is commonly known as duodenal ulcer, but of the reason why they are relieved with such certainty and success by the operation of gastro-enterostomy when all else has failed.

“Nor does this rest upon mere conjecture. The occurrence of this muscular spasm has been actually seen and watched, not only in cases in which there is pyloric stenosis, in which, of course, it is well known, but also in those in which there is no obstruction nor ever has been. There are many cases recorded now in which the abdomen has been opened under local anesthesia, and the contraction of the muscle about the pylorus has been watched from start to finish, the muscle slowly swelling up and becoming hard under the influence of some distant stimulus, and the patient simultaneously complaining of the characteristic pain. That this is the true cause of the pain, and not the irritation of the surface of an ulcer by the acid gastric juice, may be regarded as certain, and it is no less certain that the pain may occur, and occur with the greatest severity, in cases in which there is no ulcer, and in which there never has been one.

“The late onset of the pain when the duodenum is involved, as compared with its early beginning in the case of the stomach, presents no difficulty. It is simply due to the fact that the vicious circle is not started so soon. A certain vigor of contraction is required for it, and it is well known that the movements of the stomach increase in intensity

as it becomes empty. It is not due, as is so often stated, to the lateness with which food enters the duodenum. This is simply another product of the imagination. Barclay and Hertz have both of them shown as a result of *x*-ray work that bismuth, at any rate, and therefore presumably the food that is mixed with it, begins to pass through the pylorus almost at once, long before the pain commences. And the relief experienced when food is taken, which has gained for this pain the name of hunger-pain, is simply due to the fact that food entering the stomach engages for the moment the whole attention of the local nerve centres, and so cuts the vicious circle across for the time being. Unfortunately, the effect does not last long. Something more is required if the circle is to be permanently broken."

Hemorrhage, he says, may be due to ulceration, or to congestion. For the term hyperchlorhydria he has little use.

All the symptoms of duodenal ulcer—hunger-pain, pyloric spasm, occult hemorrhage, gastrostaxis and hyperchlorhydria—Moullin believes are due to the intensely hyperemic and hyperesthetic state of the mucous membrane.

X-RAY DIAGNOSIS OF DUODENAL ULCER. The clear clinical picture given by Moynihan and others of duodenal ulcer would seem to render the use of the *x*-rays superfluous in the diagnosis, so at least thinks Kreuzfuchs.¹ There are certain findings which may lend weight to the diagnosis, and these are: Hypertonicity and increased emptying power of the stomach, with persistency of the bismuth in the duodenum, so that there are remains of bismuth six hours after ingestion. This increased gastric activity Kreuzfuchs believes to be due to the interference by the duodenal ulcer of the duodenal reflex.

Haudek² has devoted considerable work to the *x*-ray diagnosis of duodenal ulcer, and believes that while old ulcers, that is, ulcers with signs of stenosis, have a characteristic *x*-ray picture, there are certain cases in which the latter is absolutely negative. He warns, therefore, against putting entire faith in this method of diagnosis.

SUBPHRENIC ABSCESS FROM PERFORATED DUODENAL ULCER. Two cases of left-sided subphrenic abscess due to perforated duodenal ulcer are reported by Rolleston³ and by Box.⁴

Duodenal Alimentation. Morgan⁵ is most enthusiastic about Einhorn's method of duodenal alimentation. He gives certain modifications of the original method, which is better read in the original than in abstract. This way of feeding the patient is suitable for selected cases only, such as ulcers with severe symptoms, which ordinarily require

¹ Wien. klin. Woch., 1912, p. 411.

² Med. Klin., 1912, pp. 181 and 224.

³ British Medical Journal, 1912, February 24, p. 423.

⁴ Ibid., April 20, p. 889.

⁵ American Journal of the Medical Sciences, 1912, cxliii, p. 670.

rectal feeding. Ulcers which have not healed under a thorough course of medical feeding, should be treated by duodenal alimentation before surgery is resorted to. It is not suitable for use in a home unless a nurse who has had experience in its use is in attendance.

Einhorn,¹ in this paper, makes a fourth communication dealing with this method of feeding.

Innervation of the Intestine. An excellent article, but which I find impossible to abstract in as brief and clear a manner as is required, has been written by Müller.² He has made careful microscopic examinations of pieces of intestine removed at operation, and discusses all phases of the subject admirably. One would wish that the entire article might be translated, for only by so doing would the reader of these lines gain an insight into the innervation of the bowel as presented by Müller.

Studies on the same subject, but along divergent paths, have been undertaken by Fröhlich and Meyer.³ The intestines were subjected to extreme distention and to various irritants, all of which caused pain. They conclude that the cause of pain in intestinal conditions is irritation of the peritoneal covering or spasm of the circular musculature.

INFLUENCE OF INTESTINAL CONDITIONS ON THE STOMACH. Under the heading of gastric neuroses, I spoke of the association of hyperchlorhydria and certain local conditions, such as gall-bladder disease and appendicitis. Although the paper by Borgbjärg⁴ does not bear directly on this point, it is a good study of the relationship between intestinal diseases and the stomach. His cases are still too few to permit of the term "comprehensive" being applied to Borgbjärg's article, still he is able to show rather conclusively that there is an associated motor insufficiency in certain intestinal conditions. Studies of this kind help one to obtain a broader grasp of gastric diseases, and serve to widen his horizon, so that he is not content to deduce that because there is some gastric disturbance the cause thereof is to be sought in that organ. I believe it was Ewald who asserted that 95 per cent. of gastric symptoms were effected by conditions apart from the stomach.

Another paper along similar lines is by Lunn.⁵ Among the ten different causes which may induce delay in evacuation of the stomach when locally conditions are normal, reflex action from an intestinal affection, habitual constipation, and ileus take the lead. In 3 of the 5 cases reported, these latter causes were manifest, the functional gastric

¹ Medical Record, 1912, lxxxi, p. 459.

² Deutsch. Arch. f. klin. Med., 1911, cv, p. 1.

³ Wien. klin. Woch., 1912, p. 29.

⁴ Archiv f. Verdauungskrankheiten, 1911, xvii, p. 706.

⁵ Abstract in Journal of American Medical Association, 1912, lviii, p. 1162.

disturbance being evidently secondary to more or less complete obstruction of the bowels. In another case, a tumor could be palpated, but it was impossible to determine whether it was in the stomach or pancreas, or glands near by. Repeated tests of gastric functioning showed much retention after eight hours, but the findings were otherwise normal, and a laparotomy revealed a bunch of tuberculous mesenteric glands.

Intestinal Flora. There has been, since the dawn of the bacteriological era, a strife concerning the importance and the real usefulness of the intestinal bacteria. The general belief is that without them there can be no physiological growth, but that the part they play in vital processes is a subordinate one. The fact remains that they are there and remain there during life, and the main question resolves itself into this, "How are we able to regulate the interchange between us and the intestinal flora so that a physiological normal is always maintained?" Strassburger expresses it: "We must be content with nature's symbiosis, and must take care to preserve the bacteria in as near a normal composition and amount as possible."

Distaso¹ holds that very little is really known of the normal intestinal flora of man. After three years' work on this subject, he finds that he is able to make the following classification of the chief types:

CHIEF TYPES OF INTESTINAL FLORA

A. Gram-negative Bacilli

1. *B. coli* group (*B. coli* Esch., Durham, *B. lactis aërogenes*, *B. acidilactici*, *B. paracoli*, *B. proteus*, *B. pyocyaneus*, etc.).
2. *B. variabilis* group (anaërobic bacilli with round extremity).
3. *B. rigidus* group.
4. *B. thetaiotaomicron* group (bacilli very polymorphic, with elliptical form).
5. *B. preacutus* group (bacilli swollen in the middle and pointed at the extremities).

B. Gram-negative Cocci

These can be classified under three groups:

1. *Sarcina citrea* group, very common in the mouth and in the feces, similar in appearance to the gonococcus.
2. *Diplococcus orbiculus* group, which are strictly anaërobic.
3. *Parvulus* group, strictly anaërobic small cocci.

C. Gram-positive Bacilli

1. *B. acetogenes* group. The greater number of the Gram-positive bacilli belong to this group. The *B. acetogenes* β is the chief representative, since the *B. bifidus* and *acetogenes* α are very rare in the feces examined in London.
2. *Streptobacillus* group. This microbe always exists in the intestinal flora.
3. *Diplob. acuminatus* group. An anaërobic bacillus. It produces butyric acid.
4. *B. perfringens* group. An anaërobic microbe. It produces enormous quantities of butyric acid.

¹ Lancet, February 24, 1912, p. 496.

5. *B. œdematis maligni* group, with the *B. sporogenes* (Metchnikoff).
6. *B. rodella* group. Anaërobic group of very long bacilli.
7. *A lemon-shaped bacillus*, which is stained by iodine and is described by the author as being a butyric acid producing microbe. It has not yet been obtained pure.

D. Gram-positive Cocci

1. *Enterococci* group, in chains, less frequently diplococci.
2. *Small cocci* group. Are also to be seen corresponding in size to the coccus Banani, to the *Staphylococcus pyogenes*, and to the *Staphylococcus assaccharolyticus*.
3. *Streptococcus intestinalis* group. This group contains the streptococci of Hirsch-Liebmann.

In addition three kinds of *spores* are to be found.

1. Oval spores, rather large, which may belong to the *B. sporogenes* and to other
2. Round spores, which may belong to the *B. putrificus* (Bienstock-Tissier) or to the bacillus of Rodella and to the *B. alkaligenes anaërobicus*.
3. Very small spores, strongly refractile, belonging to the *B. perfringens*.

These species may be identified by simple microscopic examination.

It is very evident that, as the nirtogenous substances diminish, the bacteria in the intestine become more abundant, and the species more numerous. This fact is difficult to explain if we do not consider a factor of great importance—intestinal stasis. When this is present the conditions which obtain in the colon may be compared to those in the test-tube. Another factor in the large intestine is the absence of sugars. The large bowel does not contain either albumin or peptone. It contains only derivatives of the latter substance, and the microbic flora present in the large bowel must adapt itself to these surroundings. We find on studying the biology of the organisms that it is the indol-forming organisms which predominate.

From this point of view he has classified the intestinal microbes as follows:

A. Non-indol-forming Organisms

1. *Amylolytic organisms*. They produce sugar from starch.
2. *Saccharolytic organisms*. We divide this group according to the principal acid found in the culture:
 - (a) *Acetogenic*.
 - (b) *Butyric*.
 - (c) *Lactic-acid-producing*, but this group does not exist in the intestinal flora.
3. *Asaccharolytic organisms*. These do not touch the sugars with the possible exception of a very slight action on glucose.
4. *Gelatinytic*. These dissolve gelatin, but they do not act upon coagulated albumin.

B. Indol-forming Organisms

- | | |
|--|----------------------------|
| 1. <i>Amylolytic</i> . | 3. <i>Asaccharolytic</i> . |
| 2. <i>Saccharolytic</i> . | 4. <i>Proteolytic</i> . |
| (a) <i>Gelatolytic</i> ; (b) <i>Peptolytic</i> . | |

Distaso thus shows that in the intestine organisms of groups having similar biological properties can replace one another. He is positive

that no organisms exist which act upon cellulose, which statement is most interesting, as Klotz,¹ writing on the importance of intestinal flora in children, says: "To sum up our present knowledge of the bacteria of the human adult intestine, we must say that the microorganisms are probably essential to our health, but they are *certainly* only important on account of their action on cellulose." Distaso proves his own contention, as he inoculated tubes with filter paper and found no solution of the latter. He does not believe that the bacillus coli has had any function enabling it to prevent putrefaction, but declares that the flora of the normal adult is certainly harmful and far from defending the organism against infection, it may be said to help the latter. Furthermore, indol and bodies belonging to the heterocyclic and aromatic series may have an inhibitory action on intestinal peristalsis or may even invade the mucous membrane, thereby predisposing to constipation and diarrhea.

He devotes considerable space to the intestinal flora in constipation. The feces in this condition have the following features: (1) They are dry and somewhat like goat's excrement. (2) The total number of bacteria is less than normal. (3) Gram negative-forms are almost entirely absent. (4) Spores are very abundant. He was able to reproduce these same bacteriological phenomena by incubating feces, and he concludes that this putrefaction *in vitro* is a counterpart of what is going on in the large intestine in constipation, namely, putrefaction *in vivo*. Therefore in constipation not only is there auto-intoxication by the products of bacteriological growths, but the disappearance of the bacteria indicates a process of autolysis, the products of which, when absorbed, cannot fail to be harmful. Distaso does not state that they are absorbed nor does he state how he recognizes their absorption, two points which will probably be detailed in a future paper promised us.

He has studied the fecal flora of patients (Lane's material), within the large intestine (38 cases). Before operation the flora of these patients were typical of constipation, but after the operation it suddenly changed, and henceforth resembled that present in infants. If the ill effects of constipation are due to bacteria associated with this condition, these effects will be abolished by the operation. Therefore he feels justified in concluding that constipation, and the resulting intoxication, are caused by the intestinal flora, and that the large intestine is the seat of the trouble.

He explains the occurrence of constipation as follows: "Doubtless the products of the intestinal bacteria, by increasing secretions inhibiting the submucous plexuses, give rise to stasis. The accumulation of feces in the colon causes the viscera to fall downward, dragging on the organs which are attached to it. The ileum especially is affected,

¹ Berl. klin. Woch., 1912, p. 884.

so that it may be almost occluded, or the ileocecal valve may become inflamed, and thus the passage of feces be further impeded. Constipation is due to the intestinal flora which causes the retention of the feces in the large bowel for a long time. These undergo putrefaction. Hence the production of the soluble poisons on the one hand, and the extraction of the poisons retained by the dead microbes on the other, give rise to auto-intoxication. All these phenomena are removed by the removal of the large intestine. Therefore there is no doubt that the seat of constipation is in the large bowel, and that the intoxication occurring in a constipated person is the result of the activity of the microbes of the intestine."

This paper of Distaso's is but a forerunner of an extensive article, so it would be unfair and unwise to criticise it from the meagre data therein contained. I feel that he has jumped at conclusions, as I fail to see the connecting links at times, but these (to me) chasms may have been crossed on well-constructed spans of work, so that what appears to my mind a leap, having seen him on one bank then far off on another, may be, after all, a progression over solid structure. I shall await his future paper with eagerness.

A paper which is not specially original is that of Reismann,¹ who presents, nevertheless, a very good general review on "The Intestinal Flora and its Work."

Intestinal Putrefaction. Much has been written of late years about the subject of auto-intoxication, and among the dross that has been foisted upon the medical public, it is difficult to pick out the few shining pieces of true metal. Without attempting in any way to enter into a discussion of the subject of autointoxication, it may be definitely stated that there *is* decomposition in the gastro-intestinal tract, and there is certainly *absorption* of the products of putrefaction or fermentation. The natural sequence of thought leads us to the belief that there are secondary changes in other structures. Thus Bickel² writes. As an evidence, he cites 2 cases of migraine in which the stools presented features of putrefaction, and in which symptoms promptly disappeared when the bowel movements became normal. He says that we do not know what bacteria cause the putrefaction, nor why they should suddenly begin to be active without apparent reason. We do know, however, that the intestinal flora can be modified by the kind of food eaten, as Herter has shown that changing from a protein to a carbohydrate diet is followed by changes in the flora, modification in products of putrefaction in urine and feces, and changes in the clinical phenomena. As an index of putrefaction, Bickel has studied the output of fatty acids. He gave to dogs for a certain number of days, certain diets, one of pure vegetable albumin (lecithin albumin),

¹ Australasian Medical Gazette, 1911, xxx, p. 299.

² Arch. d. Mal. d. l'App. Dig., 1911, v, p. 589.

one of horse meat, one containing potatoes, horse meat, and butter, and one of potatoes and milk. With the first diet there was the least amount of fatty acids ($44.72 \frac{n}{10}$ NaOH); with meat, 58.09; on the mixed diet, 64.77; and on the potato meal, 163.72. The high amounts found in the last are most interesting as the dog has not the power of digesting starch, which appears in the feces unattached. Similar studies on man would be of great value.

Sherwin and Hawk¹ have studied the effect on the putrefactive processes in a fasting man, then later with a low protein diet, and, finally, on a high protein regime.

Intestinal putrefaction, as measured by the output of urinary nitrogen was markedly decreased during the fasting interval, while in the interval of low protein diet, there was a rapid increase which exceeded that found while on the high protein food.

Sutter² devotes a lengthy article to the question of the relation of toxemia to chronic arthritis, and Floersheim³ speaks of the effect of putrefaction on the nasal mucous membrane. I should not even mention the latter paper, and do not do so on account of its worth, but on account of its demerits. When one says the following: "It is a simple matter to detect the putrefactive and fermentative changes in the large intestine. These are quite readily observed in the chemical examination of the urine, as I will later demonstrate to you with the different tests, and it takes but little time, study, and practice to obtain the necessary knowledge and skill to make these tests, whereby deductions can be made which point to the disturbing factors; correct and rational appropriate measures can then be invoked to the material benefit of the patient, and a relief of the medical adviser." When one, I repeat, makes a statement like that, it is time that he should be taken to task. Our "short-cut-to-the-diagnosis-of-putrefaction" writer then proceeds to urge us to cast an eye on his indican test, which he uses in forming his erudite opinion of intestinal toxemia. I should suggest to this chemist (?) that he acquaint himself with the subject of which he at present shows no evidence of familiarity before he writes again so entertainingly. Entertainment may be of many sorts, and Dr. Floersheim would not have been much gratified at the entertainment derived from his article. I should like very much to write fully on this subject, but space prevents. It must be said, however, to Floersheim and to those who may have read his paper, that it is *not* an easy matter to detect evidences of putrefactive changes in the large intestine. They can be detected, it is true, but to hold that indican is a reliable index makes some of us who have worked many years on this subject, marvel at the medievalism of some present-day physicians. The diagnosis cannot and never will be made from one test alone;

¹ Journal of Biological Chemistry, 1912, xi, p. 169.

² New York Medical Journal, 1912, xcv, p. 365.

³ Ibid., p. 436.

to recognize the condition, many laborious examinations are required, and should Floersheim or any other physician believe otherwise, it would be better for the benefit of the patient "and for the relief of the medical adviser," that an opinion of one well qualified to make a *urine* examination be obtained.

I am sorry to level the shaft of criticism at A. L. Benedict,¹ but an article on indicanuria always provokes an aim, especially when its detection is held in as high esteem as it is by the author.

Cornwall² also errs when he says, "The urine was negative," and once when indican was normal he expresses surprise "in view of the importance so generally ascribed to the degree of indicanuria as an index of putrefaction toxemia." What does he mean by "normal urine"? Is it one which is free from indican? I judge this is his criterion of intestinal putrefaction, although he lays weight on the therapeutic test. All who write in this loose manner are accountable for the odium which has accrued to this subject, and make it difficult for serious investigators to have their work recognized.

Newburgh and Wooley,³ after studying the effects of indol and tyrosin injections, find little ground for believing in the toxicity of indol, although they say they believe that the group of bodies of which indol is one, does cause symptoms in man. Certainly by no means all persons with a persistent indicanuria are sufferers from intestinal auto-intoxication, although it is true that there are individuals with persistent indicanuria whose symptoms are relieved when this disappears. I have made many thousands of examinations, and have been able to constitute no relation between indican and symptoms. Many of the most severe cases of autointoxication have not shown this body, and many cases without evidence of auto-intoxication have been repeatedly found to excrete indican.

Constipation. While Agéron⁴ says the terms spastic and chronic constipation have no place in medicine, and while he regards constipation as a disease, *sui generis*, yet he believes there are certain forms, such as gastrogenous, cecal, rectal, and nervous (!). No one can comprehend the subject unless the physiology of the movement of the feces through the intestine is understood, so in order that we may not be open to this criticism, I give Agéron's views.

Normally, defecation takes place not only in response to a stimulus in the rectum aroused by the column of feces, but is also dependent on the amount of fluid or solid food in the stomach, and on the shape and consistence of the feces. There is a relation between the peristalsis of the stomach and intestine, although this is not well understood.

¹ Archives of Diagnosis, 1912, p. 159.

² Medical Record, 1911, lxxx, p. 1269.

³ Lancet-Clinic, 1912, cvii, p. 404.

⁴ Archiv f. Verdauungskrankheiten, 1911, xvii, p. 584.

He gives an example of bowel movement after a certain breakfast in patients who had been habitually constipated, and he believes, although the various movements of dressing and washing play a role, that the principal part is taken by the filling of the stomach with food.

When the feces have not a certain amount of moisture, when they are dry, tough, sticky, doughy, or like putty, or, in other words, when they represent only the remains of a food rich in protein, there is interference with their propulsion, especially from the cecum to the hepatic flexure. A second cause of delayed evacuation is to be seen in the lack of continuity which such fecal masses represent, making it difficult for the intestine to move them along, and a third reason is that but little stimulus is given the colon to contract on account of the small amount of feces clinging to its walls.

Although certain articles of food are regarded as constipating or laxative, a normal man with normal gastric chemistry and motility will have normal bowel movements even though he eat food which is generally regarded as being constipating; a patient suffering with gastric trouble, on the other hand, will find he is just as constipated on the laxative food as he was on the other variety. This leads Agéron to the belief that the rapid and uniform exit of food from the stomach to the small intestine, and from there to the cecum and ascending colon, is more important than the food itself. In gastric disease, when there is retention, the food enters and leaves the small intestine slowly, irregularly, and in this manner reach the colon in small, dried-out masses, which are not able to stimulate the intestine enough to contract. Another factor must not be lost sight of, and that is that patients with stomach trouble eat less than others and drink less. This sort of constipation he calls *gastrogenous*.

In the treatment of this form we are on the horns of a dilemma as we cannot give a food which will form bulky stools on account of the underlying gastric condition.

The first endeavor is to learn the exact condition of the gastric motility. Having ascertained this, Agéron recommends giving solid food during the day, and liquid just before going to bed, as he states the stomach is better able to empty itself when the patient is in a horizontal position. He is not in favor of agar, as recommended by Schmidt, but suggests buckwheat meal cooked with butter, in connection with food which is compatible with the chemistry of the stomach. He says the secret in bringing about bowel movements is to give fluids at the proper time, milk, for instance, should be taken in 500 c.c. amounts, fasting in bed before going to sleep. When there is a dislike for milk, he recommends thin oatmeal porridge with 2 teaspoonsful of milk sugar.

Agéron criticises the physician who blindly prescribes purges or laxatives without considering the conditions he is treating. Hard

pills and compressed tablets often remain in the stomach for days at a time. Carlsbad salts cause transudation in the stomach and cause an unnecessary amount of fluid to be poured out into that already dilated organ. Equally dangerous are infusions of aloes, and rhubarb, with salts of sulphuric acid. Equally inefficacious are those popular idols, honey, fruit, marmalade, compotes, etc., as they cannot leave the insufficient stomach, do not contain enough waste structure to form feces, and, finally, by their gas-producing tendencies, cause distention of the bowel, which makes the latter also insufficient.

The principal thing to observe in prescribing laxatives is to give the ones which work and to give them at the proper time. The *latter* is when they will be most rapidly expelled from the stomach, namely, early morning or late evening. Enemas should be given, in place of laxatives by mouth, when there are perigastric adhesions. (Emulsion of water, soda and oil, or oil and glycerin, as enemas.) These are best given immediately after breakfast. He is most enthusiastic about electricity in the form of the faradic current. Massage has not much value. The use of mineral waters seems to be productive of benefit for a short time, but their good effects are but evanescent at best. At times it is surprising to note that mineral waters often seem to be constipating, and this is probably due to the overloading of an already insufficient stomach, and also to the fact that the stomach, when one stands upright, cannot empty itself well. A third factor is that much drinking of these waters cuts down the intake of food by decreasing the appetite.

The views of Agéron are borne out in an article by Schwarz.¹

The treatment of constipation by means of exercise is discussed by Fernet.² The patient, before arising in the morning, is to lie on the back, and take five or six deep breaths, with the mouth closed, protruding and retracting the abdomen with each respiration. After a few moments of natural breathing, the same procedure is repeated, and is kept up for five or six times. By means of the deep breath, Fernet claims that the abdominal organs are subjected to a kind of massage, is further augmented by manual massage during the remissions of normal breathing. After rising and bathing, the patient should partake slowly of breakfast, and afterward go to the toilet, whether he feels the desire to defecate or not. If there is no bowel movement, the breathing exercises should be repeated, and in place of the massage, rectal gymnastics should be practised, consisting of voluntary movements of the anus, efforts at expulsion and of retention. Under no condition should there be any straining. Fernet is insistent that there should be no laxative, enema, or suppository used, for with his treatment any auxiliary measure is unnecessary.

¹ Münch. med. Woch., 1911, p. 1489.

² Bull. de l'Acad. de Méd., 1911, 3d series, lxx, p. 662.

In seeking for objective signs of constipation, Singer and Holzknecht¹ regard some x-ray findings of some significance. These consist of hypertonicity and hypermotility of the distal and proximal portions of the colon, the boundary marking the two being between the right flexure and the end of the descending colon.

THE USE OF HORMONAL IN CONSTIPATION. Since the note in *PROGRESSIVE MEDICINE*, December, 1911, p. 67, concerning this peristaltic hormone of Zülzer, there have appeared a number of articles which have been unfavorable toward the preparation, on account of some of the unfortunate results attending its use. Zülzer declared that the only symptoms which followed its administration were rise in temperature and headache, which, when compared to the reported value of the preparation, would seem to be insignificant.

Kretschmer² was of a similar opinion until he met with alarming symptoms after an injection of hormonal. These consisted of collapse of such a severe grade that no hope was offered of the patient's recovery. Under vigorous treatment she recovered, but it was some days before she was able to leave the hospital.

Kretschmer discusses the possibilities of air embolus and of cresol poisoning (cresol being used for the preservation of the hormone), but dismisses both after a brief consideration, and insists that the unfortunate state of the patient must be blamed on hormonal.

Dittler and Mohr³ had previously reported a somewhat similar case which caused the authors the greatest alarm on account of the severe collapse. Experiments on a cat showed a marked fall of blood pressure from 130 mm. to 40 mm.; with paralysis of the respiratory centre and marked cardiac symptoms. Kretschmer compares his with Dittler and Mohr's case, points out that in both there was a previous illness accompanied with fever; and he warns against the use of hormonal in such cases, especially as the functionally weakened heart cannot respond to the lowered blood pressure as does a normal organ.

A third case is reported by Hesse,⁴ and his attitude is one of extreme fear, for he says: "My case and those of Kretschmer, Dittler, and Mohr do not agree with the statement of Zülzer regarding the harmlessness of the intravenous injection of hormonal. A remedy which has caused three serious collapses, in but a few hundred published cases, is certainly no harmless measure." He suggests that the blood-pressure-lowering properties which are those that cause the most anxiety, might be overcome by using adrenalin previous to the injection of hormonal.

Rosenkranz,⁵ Frischberg,⁶ and Wolf⁷ all publish instances of undesired

¹ Münch. med. Woch., 1911, p. 2537.

² Ibid., 1912, p. 474.

³ Deutsch. med. Woch., 1912, p. 643.

⁴ Münch. med. Woch., 1912, p. 931.

⁵ Ibid., 1912, p. 990.

⁶ Ibid., 1911, p. 2427.

⁷ Ibid., p. 1107.

and unpleasant effects from the hormone. Zülzer, aroused by what he regards as an unwarranted attempt on the part of Kretschmer to discredit his preparation, attacks his work very sharply, claiming that an analysis of his report shows that the patient simply fainted as do even soldiers during vaccination. He sarcastically says that if Kretschmer had kept the patient's head lower, and had not used injections "for hours," "the patient would have recovered sooner from the (apparent) danger."

In view of the reports since Kretschmer's, the "faint" theory of Zülzer's does not impress me very favorably.

The effect of injection in dogs has been studied by Sabatowski,¹ in Popielski's laboratory, and hormonal was found to cause rapid lowering of blood pressure, loss of coagulative power of the blood, salivation, and an insignificant increase in intestinal peristalsis. These effects are but temporary, and soon disappear. Sabatowski urgently warns against its use in man.

Two of our countrymen, Hoxie² and Lincoln,³ report some success under its use, but neither author seems specially enthusiastic about it.

Popielski⁴ attacks the hormone theory in general, and, among others, the peristaltic hormone of Zülzer. He claims that intestinal peristalsis can be produced by the extract of any organ, and that it is a secondary effect of the lowered blood pressure. The cause of the lowered blood pressure is "vasodilatin," which he has found present in all organ extracts.

In view of the adverse criticism levelled at hormonal, I am convinced that is no harmless measure for constipation, and that it must be used, *if at all*, only with most extreme caution.

Chronic Diarrhea in the Adult. Our author, Hutchison,⁵ emphasizes that diarrhea is not a disease, but a symptom, and if it is to be treated properly, one must spare no pains to discover the nature and site of the disorder in the alimentary canal which is causing it. He describes the following forms:

1. **GASTROGENIC DIARRHEA.** This is a looseness of the bowel due to imperfect digestion in the stomach. The latter, in turn, is due to insufficient secretion of gastric juice, sometimes amounting to complete achylia. This acts in one or two ways, either the absence of hydrochloric acid favors putrefactive and fermentative processes, or the imperfectly dissolved food which leaves the stomach, sets up irritation of the small intestine mechanically. Of subjective symptoms there are very few, there being rarely any digestive trouble except a distaste

¹ Wien. klin. Woch., 1912, p. 116.

² Interstate Medical Journal, February, 1912.

³ New York State Journal of Medicine, March, 1912.

⁴ Münch. med. Woch., 1912, p. 534.

⁵ British Medical Journal, June 8, 1912, p. 1277.

for meat. The diagnosis is to be made by means of the test meal, the gastric contents after which being but small in amount, imperfectly digested, with low acidity, and no free HCl. Hutchison suggests as *treatment*, a finely divided diet, very little meat, hydrochloric acid, and pepsin.

2. PANCREATIC DIARRHEA. This form arises from a failure of the pancreatic secretion to enter the intestine from whatever cause, but, in any event, the stools are pale in color, very offensive, and contain, upon chemical examination, an abnormally high proportion of unsplit fats. There is a form of pancreatic insufficiency known as "pancreatic infantilism" which probably accounts for some cases of this form of diarrhea. The *treatment* consists in reducing the fat in the diet, in replacing starches by dextrinized or malted foods. Holadin or pancreon, administered three hours after meals, is recommended. Often surgical treatment is required.

3. FERMENTATIVE DIARRHEA. Under this heading, Hutchison describes a form which appears to be due to defective digestion of starch. Men of about middle life seem to be most often affected. The symptoms consist of the passage of frothy and very acid stools, along with a good deal of intestinal flatulence. Upon microscopic examination there is seen a large amount of unaltered starch. The *treatment* which the author recommends is reducing the amount of starch in the diet and in the administration of calcium carbonate, which therapeutics generally causes disappearance of symptoms.

4. ENTERITIS. Contrary to the usual belief, Hutchison regards chronic diarrhea from this cause as distinctly rare in the adult. As causes he cites alcoholism, hepatic cirrhosis, phthisis, and the prolonged use of arsenic and digitalis. Bile-stained mucus is said to be indicative of catarrh of the small intestine, although he says very properly, the diagnosis has to be made by exclusion. The diagnosis having been established, the treatment is not an easy matter. The latter as given in the article does not differ materially from the treatment as generally practiced.

5. COLONIC DIARRHEA which is accompanied by visible mucus and blood in the bowel movements, he says may be caused by (a) malignant disease, (b) catarrhal colitis, (c) ulcerative colitis.

6. NERVOUS DIARRHEA. By this is meant that form of chronic looseness of the bowels in which no organic disease or secretory defect is to be detected in the alimentary canal, but in which the disorder appears to result from an exaggerated irritability of the nerve mechanism of peristalsis. Two types can be recognized. In one the action of the bowels tends to take place immediately after or even during meals, and this has received the name "postprandial" or "lienteric" diarrhea. More generally seen in children, the fault appears to consist in an exaggeration of the normal reflex stimulation of peristalsis, which

always takes place to a slight degree when food enters the stomach. The other type of nervous diarrhea is occasioned by emotional impressions. Hutchison believes that there may be, in some cases, an underlying degree of catarrh of the colon which causes the latter to respond forcibly to nervous impulses, which, in a healthy individual, would only be sufficient to produce a mild stimulation of peristalsis.

Diet is not of much value in the treatment of this form of diarrhea, and of all the drugs, Hutchison places more reliance on opium.

Colic. In the address of Rankin¹ this subject receives special consideration, and, on account of the clearness with which it is depicted, I recommend all to read it.

The author takes up in the most lucid detail the varieties of colic, describing the clinical features and clinical course. The homely example of colic due to muscular spasm of the intestinal walls resulting from the presence of irritating and unsuitable foods, is first considered. Then follows a discussion of biliary colic, renal colic, and the colic of plumbism. These are clinical examples of paroxysmal pain due to irregular contraction of non-muscular fibres which are met with in the abdomen. Besides these are the less common causes of colic, such as neurotic dyspepsia, pancreatic calculus, spasm of the appendix causing a partial occlusion of its lumen, loose right kidney, embolism, or thrombosis of the mesenteric vessels. Attacks of colic are seen in patients of a gouty type whose vessels have become atheromatous, and who suffer from continuous high arterial pressure with occasional anginal attacks. Colic is also seen in angioneurotic edema, severe diabetes, aneurysm of the abdominal aorta, malignant disease of the abdominal organs, or of the retroperitoneal glands; hysteria, locomotor ataxia.

Intestinal Arteriosclerosis. Two lesions are of importance, according to Lagane:² atheroma of the mesenteric arteries, and arteriosclerosis of the vessels in the walls of the intestine. The first form seems to be a part of a general arteriosclerosis, and is often seen in syphilitics and commonly in those individuals aged over fifty years who are subjects of arteriosclerosis. The second variety occurs more frequently in young people following acute or chronic disease of the intestines, in alcohol, lead, and syphilis intoxications, and in cases of infarction.

Of all the symptoms, pain is the most conspicuous and resembles in striking degree the pain of angina pectoris. It is usually elicited by muscular effort or mental worry, without any relation to the intake of food, and is described as a burning, tearing, pain sometimes colicky in nature. It is located especially in the umbilical region, and is followed by nausea, vomiting, and abdominal distention. It lasts some time, but is relieved by rest, although recurrences may take place several times in a day. The general impression conveyed by an attack

¹ British Medical Journal, June 22, 1912, p. 1409.

² Presse Méd., December 13, 1911, p. 1025.

is that it is a painful spasm, accompanied by meteorism and transitory paralysis of an intestinal segment. During a crisis the abdominal aorta (!) becomes so sensitive that the contact of clothes is insupportable, and this sensation may persist after the attack. The intestinal symptoms are of less importance, and consist of abdominal distention, alternating diarrhea, and constipation, with mucus in the stools, sometimes blood. The pain seems to be the expression of a neuralgia or neuritis of the celiac plexus.

So much for the attack itself. Between the attacks there are digestive disturbances, consisting of heaviness in the epigastrium, regurgitation, flatulence, and often an overwhelming desire to sleep. Vomiting is rare. The liver is enlarged, and often the conjunctivæ are icteric. Constipation is marked, and there are signs of a general arteriosclerosis. Lagane says constipation is the rule, but there may be alternating attacks of bloody diarrhea. There may be crises of constipation which have received, from Charcot and Erb, the term "*Crises de meiopragie intestinale*;" from Ortnier, the name "*dispragia intermittens angio sclerotica intestinalis*," and Schnitzler has contributed "*intermittierende ischämische dysperistaltik*."

These crises are characterized by marked meteorism, unassociated with any intestinal contraction. The patient feels nauseated and vomits, and there is marked pain. The respiration is interfered with by pressure of the diaphragm, and collapse may follow.

An enterospasm has been offered as explanatory of these phenomena, but Lagane believes there is the factor of intestinal paralysis due to edema of the walls, following circumscribed infarction. This view is borne out by the frequent occurrence of bloody liquid stools containing mucus. He emphasizes that he does not intend this opinion to be misconstrued, and says that by infarction he does not mean hemorrhagic infarct of the intestine. The latter, as is well known, is recognized by the terrific pain, signs of grave hemorrhage, hemorrhagic vomit, profuse and bloody evacuations, meteorism, and symptoms of intestinal occlusion, with a fatal outcome in three or four days.

The diagnosis is always difficult. Much value has been ascribed to tincture of *strophanthus*.

The English writers have of late been calling attention to a condition which is in all probability the same as that described by Lagane. They have named it *angina abdominalis*, as it resembles the better known *angina pectoris*.

Abdominal Angina. The term *angina abdominis* is said by Minella¹ to have been used by Baccelli in his clinic at Rome, and Pal² has written quite extensively on the subject. So say Sir Lauder Brunton and Williams,³ in describing a case. The same name was coined by

¹ Abstract in *Centralbl. f. inn. Med.*, 1903, p. 210.

² *Gefäßkrisen*, Leipzig, 1905; *Wien. med. Woch.*, 1904, p. 574.

³ *Lancet*, April 6, 1912, p. 921.

the senior author of the article, but, upon looking up the literature, he found that the term had already been used some years previous.

The patient was a man, aged sixty-eight years, who had been suffering with glycosuria for twenty-five years. He was subject to severe pain which came on when he began to walk. In this respect the pain resembled that of angina pectoris, but it differed in its position, as it was most severe in the umbilical region, and was attributed to flatulence. It gradually increased in severity and extent, so that it spread all over the front and back of the chest and caused perspiration to break out over his body. On account of the resemblance to angina pectoris, trinitrin tablets were prescribed, with the most satisfactory results, as they cut short the abdominal pain in the same way as it would have stopped anginal pain in the chest.

In a clinical note Somers¹ quotes a case of abdominal angina occurring in a man, aged eighty years. The attacks of pain always came on after exertion, and were located in the umbilical region. During the first attack in which the patient was seen, he appeared to be *in extremis*, his body being covered with perspiration and his whole appearance such as to suggest that he had not many minutes to live. On examination, however, it was found that the pulse was not appreciably affected, and after the administration of morphine the pain subsided. Treatment by nitrites has been most efficacious. Smyth² makes a short contribution to the same subject.

Infarct of the Transverse Colon. Gillett³ reports such a case, which I reproduce, as, taken in conjunction with the foregoing, it makes rather a complete presentation of certain indefinite conditions, the diagnosis of which may be very difficult:

"The patient, a woman, aged forty-nine years, had been troubled with piles for some time, but was otherwise well, till she awoke in the night of December 18, 1910, with severe sense of pain in the epigastrium and flatulence. She blamed the cocoa she had had for supper. On the 19th diarrhea began, and the pain in the abdomen increased. On the 20th the diarrhea continued, and there was nausea. Blood in the stools was first noticed in the afternoon. During the following night she had two actions of the bowels; both were practically pure blood, bright in color, and only very little fecal matter (perhaps half an ounce in weight). Some clots were present, of the size of half a hazel-nut—about 5 ounces of blood in each stool. On the 21st there was more nausea; the abdomen was not distended. The pain was mostly below the navel and right across the abdomen; there was slight rigidity all all over. The pulse and temperature were normal. On the 22d an

¹ British Medical Journal, May 11, 1912, p. 1072.

² Ibid., May 18, 1912, p. 1127.

³ Lancet, July 22, 1911, p. 220.

enema of olive oil was retained. Two actions followed: (1) charged with blood and fecal matter; and (2) no blood, but pultaceous fecal matter. On the 23d the abdomen was a little distended, and there was more nausea. The temperature on the previous night was 99° F. The pulse rose to 84. A distinct thickening could be made out between the navel and the ensiform cartilage; it was tender, and moved slightly on respiration. Operation was performed that afternoon. The transverse colon for the greater part of its extent was of a dark purple color; the walls were greatly thickened. It did not look gangrenous. The ascending colon was anastomosed to the lower part of the descending colon. The patient did well for the first twelve hours. Then she had tetanic spasms, which continued at intervals of a few minutes for nearly twelve hours. She died late in the afternoon of the 24th, and a postmortem examination was performed. The transverse colon was of a dark purple color; the walls were greatly thickened, and the lumen was much reduced. There were minute hemorrhages in the walls, which were microscopically shown to be in a condition of infarct. The branches of the colica media were empty; no emboli were found; there was no peritonitis, but there were hemorrhages in the transverse mesocolon. There was a small amount of blood-stained fluid in the peritoneal cavity. Microscopic examination of the mesenteric arteries did not show any sclerotic changes. There was an old mitral lesion, with some narrowing of the orifice, and a few vegetations on the edges of the valve."

Two types of cases have been described by Kussmaul and Gerhardt. 1. Sudden abdominal pain followed by nausea or vomiting and also diarrhea, which is at first mucous and watery, and at last bloody. Gerhardt states that the blood is bright red when the inferior mesenteric is obstructed, but that in obstruction of the superior vessel it is darker. Kemp states that it is generally dark. In the present case it was bright red in the actions on the third day of the illness. (2) The second type of case simulates acute intestinal obstruction, with distended painful abdomen and sometimes feculent vomiting. Apparently this case illustrates the first type, though signs of obstruction showed themselves before operation was resorted to.

The mortality is very high, 92 per cent. Death occurs within three days as a rule; the longer duration, six days in this case, may have been because the colon was affected and the obstruction was not complete.

A case of infarction of the small intestine, which was operated on *ten days after* the initial symptoms, is quoted by Hempelmann.¹ The author discusses the clinical course and symptomatology with which we are now familiar from the preceding lines.

¹ Interstate Medical Journal, 1912, xix, p. 134

Acute Intestinal Obstruction. DIAGNOSIS (EARLY). Groves¹ urges by illustrative cases, the early diagnosis of acute intestinal obstruction, and states that unless an operation is performed within twenty-four or forty-eight hours, "one might as well wait a little longer for the post-mortem examination." He emphasizes that "persistent abdominal pain of a severe type, unrelieved by rest and starvation, must remain the most notable sign, and often the only one, upon which a diagnosis is to be founded." He further warns that acid intoxication of children confuses the picture, and that if this be wrongly diagnosticated "obstruction," operation will lead to disaster. In the former there is persistent vomiting, but there is a marked absence of pain, a tendency to drowsiness, and a sweet odor to the breath, also acetone bodies in the urine.

CAUSE OF DEATH IN OBSTRUCTION. The cause of death in intestinal obstruction has received small attention from investigators. Hartwell and Hoguet² conceive it to be a toxin in the circulating blood producing fatal lesions in the kidney, liver, and other tissues. The reason that these toxins are absorbed is that there is an injury to the lining cells of the intestine which is caused by the irritating action of the intestinal contents (stagnation), and by the mechanical action of stretching. The nature of these toxins is unknown, although the authors think the latter arise from the secretory activity of the various digestive glands, or from bacterial activity.

Draper³ presents a paper which, to me, is so obscure in its writing, that I found it difficult to follow his process of reasoning. The conclusions at which he arrives are:

1. Epithelial cells of jejunum and ileum given by mouth to duodenally obstructed dogs, prolonged life in a series of 15 animals by about thirty-six hours over a similar series to which they were not given.

2. The average pulse rate of the treated dogs was 33 beats lower than that of the unhealed.

3. The belief that we were dealing with a cytologic product was strengthened by the trend of the charts. They showed that beneficial action occurred early, just as in the case of any successful treatment by antibodies.

He does not believe that the toxemia is bacterial in origin, but is dependent on an interference with glandular interaction, and he believes by feeding the mucous membrane of the jejunum and ileum, that the missing or necessary glandular substance is replaced or supplied.

Murphy and Vincent⁴ conclude that the toxin is purely bacterial in origin, because the substance is destroyed by boiling and because it

¹ Bristol Medico-Chirurgical Journal, 1912, p. 37.

² American Journal of the Medical Sciences, 1912, cxliii, p. 357.

³ Journal of American Medical Association, 1911, lvii, p. 1338.

⁴ Boston Medical and Surgical Journal, 1911, clxv, p. 684.

does not pass through a Berkefeld filter. The criticism which Hartwell and Hoguet make of this is that their (Murphy and Vincent's) work merely shows that bacteria, if they gain entrance into the peritoneum, will kill. They do not disprove the presence of *other poisons* in the obstructed intestine, which being slowly absorbed over a period of some hours or days, will kill with the symptoms of ileus.

FECAL OBSTRUCTION. Roussel and Williams¹ report a case of fecal obstruction of the small intestine which ended fatally. In the same condition, Markley² found a massive dose, 3j (!) of phenolphthalein with 10 grains of calomel, of marked service.

INTESTINAL OBSTRUCTION DUE TO GALLSTONES. Three cases of gallstone ileus are reported by Martin,³ 1 by Owen,⁴ and one by Lund,⁵ quite a large number to have occurred within a year, inasmuch as up to 1910 there had been but 250 cases, and in 50,000 patients in the Rochester Royal Infirmary there had been but 1 case from 1893 to 1896.

X-RAY DIAGNOSIS OF OBSTRUCTION. Haenisch⁶ suggests that a mixture of bismuth, etc., be given per rectum, and, while it is being introduced, that a fluoroscopic examination be made. In this way the course of the bismuth can be observed, and any obstruction to its progress easily noted. Depending on the degree of stenosis, there is a more or less complete stoppage of the bismuth. The latter may be expressed in various forms of shadow, and in some cases the stoppage is temporarily followed by the appearance of a finger-like process, which, after 10 or 15 cm. becomes the normal-sized shadow. Haenisch says by this method it is possible to make a differential diagnosis between tumor, spasm, and constriction of the bowel by adhesions.

Schwarz⁷ holds that only diagnostic difficulty is to be seen in enteroptosis, but he believes that the two may be differentiated. In enteroptosis the bismuth is seen for from ten to twelve hours, in stenosis from twenty-four to seventy-two. The folds of the intestine in enteroptosis are normally placed, whereas in stenosis they are all rolled together, and appear as a long shadow across the abdomen. The lumen is also unaffected in ptosis, but in stenosis, dilatation of great degree is seen, with enormous accumulation of gas and fluid. The last point has received emphasis from v. Czyhlarz and Selka.⁸

Chronic Intestinal Stasis. An article by Lane⁹ deserves a full abstract in view of the great amount of attention the subject of intestinal stasis

¹ New Orleans Medical and Surgical Journal, 1912, p. 569.

² New York Medical Journal, 1912, xcv, p. 930.

³ Annals of Surgery, 1912, lv, p. 725.

⁴ Lancet, November 11, 1911, p. 1326.

⁵ Annals of Surgery, 1911, liv, p. 321.

⁶ Münch. med. Woch., 1911, p. 2375.

⁷ Wien. klin. Woch., 1911, p. 1386.

⁸ Ibid., 1912, p. 340.

⁹ British Medical Journal, May 4, 1912, p. 989.

is attracting. Lane describes the condition as "an abnormal delay in the transmission of the intestinal contents through some portion or portions of the gastro-intestinal tract, which results in the absorption into the system of a greater quantity of toxic material than the organism is able to deal with effectually by means of the organs whose business it is to eliminate it. The excess circulates through the system and produces degenerative changes in all the tissues, and a series of symptoms result which are very definite and unmistakable to anyone who has rendered himself familiar with the condition. After a time those organs whose function it is to convert, convey, and eliminate the several toxic products circulating in the blood, themselves undergo degeneration under the influence of prolonged and progressive strain of work."

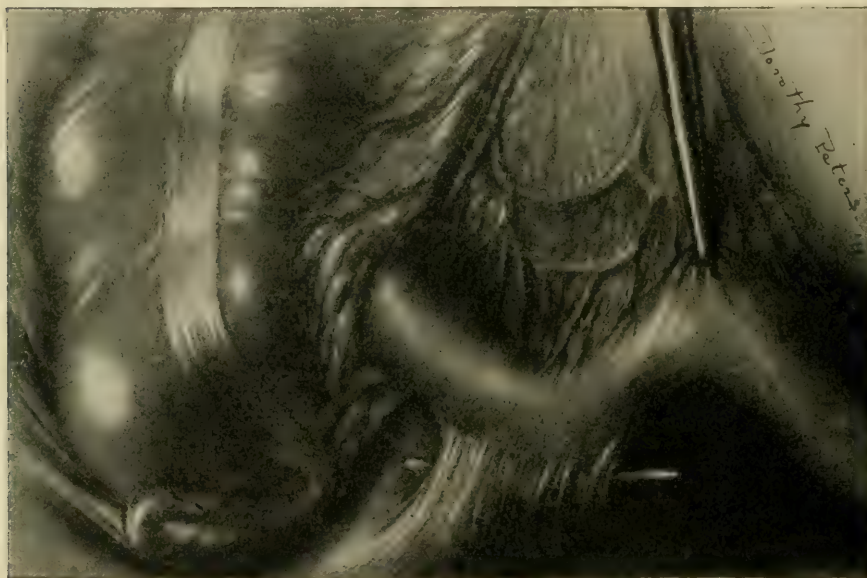


FIG. 8.—A form of Lane kink with adhesion.

Lane describes the changes which develop in the gastro-intestinal tract through defective feeding, and through the assumption of the erect posture of the trunk for many hours during the day. Among the earliest changes is the tendency for the cecum to descend into the true pelvis, and thus to interfere with the normal functioning of the pelvic colon, bladder, and uterus. To oppose this, a resistance is developed by the formation of certain restraining bands. These are seen especially in the terminal portion of the ileum, causing kinking of this portion of the gut.

"As a result of such kinking, material is delayed in the small intestine,

and there results an excessive absorption of toxic material, flooding the tissues of the body with poisonous products. The strain exerted by the overloaded small intestine, blocks the duodenum at its termination, obstructs the escape of its contents, dilates and distends this portion of the small gut, and especially the first portion, which yields much more readily to the tension since it lies free in its peritoneal covering, while the second and third parts escape because they are buried firmly behind the peritoneum.

"These tension changes, aided by chemical and bacteriological developments in the contents of the intestine, and by depreciation of the vitality of the tissue by the toxic material present in excess in the circulation, result in engorgement of the mucous membrane of the first part of the duodenum, later in its abrasion, and finally in its ulceration and perforation.

"The same causes produce infection of the contents of the biliary and pancreatic ducts, determining the formation of gallstones, producing inflammation of the lining membrane of the ducts and of the glandular tissues about them, causing pancreatic inflammation, and later cancer of the pancreatic or biliary tracts. The supposition that gallstones produce pancreatitis is merely another evidence of the common error of assuming that one effect of chronic intestinal stasis is the cause of another.

"The stagnation of material in the duodenum obstructs the flow from the stomach, and an accumulation takes place in that organ in which bacteriological and chemical changes arise. The strain exerted upon the lesser curvature by the accumulation of the gastric contents increased materially by that transmitted through the great omentum from a loaded transverse colon, aided by the chemical changes in the static gastric contents and the condition of auto-intoxication, results in engorgement, abrasion, ulceration, or in cancerous or other infections of its mucous lining. The strain is greatest at the pyloric extremity of the curve, but is felt along its entire length in a degree varying with the mobility of the pylorus. In some cases the delay may be general and fairly evenly distributed through the entire large bowel, while in others there is a definite obstruction at the upper limit of the cecum, at the hepatic flexure, in the transverse colon just below the gall-bladder and duodenum, at the splenic flexure in some portion of the sigmoid flexure, due to excessive fixation and telescoping of its length or to an irregularity of its fixation by acquired bands forming loops of bowel which become obstructed chronically or acutely, and again by the lowest acquired band which produces a kink at its junction with the pelvic colon at the brim of the pelvis."

I have already discussed the mechanics of the large bowel fully on many previous occasions, and they are most obvious and distinct. Some opponents of my views put forward as an argument against

them that they do not see and are unable to find the changes I describe, or that they consider them of no importance. I feel pleased that their inability to observe these changes is considered by them as an important argument in favor of their views, since I am sure that the more complete examination of their cases will enable them to see and understand physical conditions that were at once recognized and described by many surgeons of world-wide reputation in the United States and elsewhere. As I foretold, the American surgeon has taken the lead in this matter, and is investigating it with the energy, perseverance, originality, and promptitude that are characteristic of him. He is dealing with the varying problems presented by chronic intestinal stasis, and is endeavoring to learn the best means of meeting the disability of each portion of the drainage scheme in the most effective manner possible. The time is not far distant when we shall arrive at some general agreement on this subject.

The symptoms Lane divides into the mechanical and into those produced by the toxins.

SYMPTOMS OF MECHANICAL NATURE. There are pain and tenderness over the distended duodenum, which are usually mistaken for gallstones. Roughly speaking, the symptoms are those of indigestion—pain, distention, tenderness, vomiting, but in some cases there may be no complaint whatsoever. Although the stasis may be symptomless, its results are not any the less pernicious—ulcerative and nervous colitis may result. The *x*-ray is of invaluable aid in diagnosis.

SYMPTOMS OF INTOXICATION. The skin is thin, inelastic, wrinkled, sticky, and stained, especially in and about the eyelids. Its degree varies with the color of the hair, being very marked in dark-haired subjects, and slow to develop in those with reddish or tow-colored hair. The secretion of the skin is profuse and very offensive. Over the back of the arm the skin is thick, gelatinous in feel, and covered with small papules. The circulation is enfeebled, and the blood pressure is lowered. The ears, arms, and legs are cold, even in the hottest weather. The temperature of the body is subnormal. There is a gradual loss of subcutaneous fat, and the muscles soon become flabby. As a result of the two foregoing, there is a tendency for the organs to be restrained no longer in their normal position. The action of the toxin on the cerebrospinal system is pronounced. The patient becomes stupid and apathetic, and loses control over the temper. The degree may be so marked as to suggest dementia or imbecility. Sleep is poor and interfered with by dreams. Morning headaches are common, and patients awake feeling they have derived no benefit from the night's rest. Joint pains are common, and often serious breast changes, consisting of induration are seen. "In almost every case of cancer of the breast, a previous history of chronic intestinal stasis can be demonstrated."

Lane discusses treatment, which belongs to another department of PROGRESSIVE MEDICINE. I have, no doubt, boldly trespassed on that preserve in considering Lane's paper here, but I feel, as I have said under cecum mobile, that these borderline cases belong equally to the internist and to the surgeon.

In the recognition, by means of the x -rays, of Lane's kink and its consequences, the reader is referred to a well illustrated article by Jordan.¹ Other articles by Lane are found in *Lancet*, December 2, 1911, p. 1540, and *Surgery, Gynecology, and Obstetrics*, March, 1911, p. 227.

The writings of Lane make one stand aghast at the dire effects of chronic intestinal stasis, and makes one shudder at the radicalism of its cure. Lane's results have certainly been most striking, and the question has lately been taken up by C. H. Mayo, who is in accord with the teachings of Lane. The recognition of the benefits of new procedures, especially operative ones, is always of slow growth, so while internists oftentimes seem to lag behind in the rapid whirl of surgical progress, it is only because we first see as through a glass darkly, but later, face to face. I believe much more work must be done before the portentous evil effects of the "kink" will be generally accepted as proved, although I must admit Lane seems to stand on a firm foundation.

Cecum Mobile. In the category of borderline cases stands the condition named above. It is not at all improbable that my colleague, who has the section of PROGRESSIVE MEDICINE devoted to surgery of the abdomen will give this comparatively new diseases full discussion but I feel that it is as well treated of by the internist as by the surgeon. The articles which have been published have been divided between physicians and surgeons almost equally, so neither of them can claim the sphere of activity as his.

Sailer² is one of the few American writers (Lerch³ has also written on the subject) who have taken the conditions seriously enough to devote an article to its consideration, and, as he sketches the historical and other features of the abnormality, I shall quote freely from his paper. By cecum mobile we understand an abnormal mobility of the cecum and lower portion of the ascending colon. It may give rise to no clinical symptoms, but, on the other hand, may cause kinking, producing partial or temporary obstruction, ultimately giving rise to atony and dilatation of the cecum with associated clinical symptoms. The condition was first described by Haussmann, in 1904, with a report of 8 cases. All these were characterized by attacks of colic usually beginning with constipation, with the presence during the

¹ British Medical Journal, June 1, 1912, p. 1225.

² American Journal of the Medical Sciences, 1912, cxliii, p. 157.

³ Medical Record, 1911, lxxx, p. 766.

attacks of a movable tumor in the right lower quadrant of the abdomen that could be pushed upward, leaving an empty space in the right iliac fossa. He has now collected 143 cases, none of which has been confirmed by operation or by autopsy. To Wilms is generally accredited the discovery of the disease, for in 1908 he reported 40 operative cases. He had observed that certain cases of chronic appendicitis were not cured by appendectomy, and he concluded that the pain and discomfort might be due to a long cecum mobile, which would permit of the stretching and tearing of nerves in the mesentery. He consequently devised an operation for the fixation of the cecum by means of broad adhesions to a pocket in the iliac fossa. In his 40 cases this gave good results. Since Wilm's article, which really first attracted attention to the condition, Russian and French physicians and surgeons have reported similar cases, although Sailer says that English and American writers have not recognized the disease entity.

The anatomical basis is a congenital malformation of the mesocolon of the cecum, so that, for some distance along the ascending colon, it maintains the type of the mesentery and is not attached to the parietal peritoneum. This permits all the freedom of movement of a loop of small intestines and indeed more. It renders certain forms of obstruction possible that cause the attacks and secondarily gives rise to the distention and atony of the cecum. These obstructions are of three types: (1) Formation of a kink, usually near and below the hepatic flexure; (2) the reflection upward and forward of the cecum upon the ascending colon until the caput coli may touch the liver; (3) volvulus of the cecum. There may be a downward pulling of the cecum in certain cases, thus producing obstruction.

As for the frequency of the condition, statistics vary, but Wandel says he found 66 cases in 640 autopsies carefully studied with reference to this particular point. A conjecture is that 15 per cent of all supposed cases of chronic appendicitis may be due to cecum mobile.

SYMPTOMATOLOGY. Attacks of colic occur at irregular intervals, but which tend to increase in frequency, severity, and duration. Usually each begins with a longer or shorter period of constipation, and there is severe pain lasting for a few hours, terminating in a copious discharge of feces. During the attack there is loss of appetite, perhaps nausea, and even vomiting, but there is rarely fever, and no leukocytosis. A mass can be felt in the right lower quadrant, about the size of a small apple, firm, but not hard, and elastic, but not doughy. Nothing can be felt on the left side. Tenderness is usually present, and is most distinct near McBurney's joint. Gurgling can usually be elicited. If the patient stands or sits he usually feels worse; it is relieved and the attack often aborted if the patient lies upon the back or upon the right side. Predisposing factors are exertion and the indulgence in food which produces flatulence. During the intervals, the patient may

be subjectively well, but usually symptoms of chronic colitis are present. Sailer emphasizes the features of obstinate constipation which does not yield to laxatives. On physical examination the displacement, the distention, and the atony of the cecum are detected. Gurgling on pressure is noted. Inflation of the colon shows disproportionate distention of the cecum and more or less evidence of insufficiency of the ileocecal valve. X-ray examination is not of special value.

Klose,¹ whose work on the subject is already well known, contributes a paper in which there is a most painstaking and complete review of the whole subject, including the historical, anatomical, embryonic, and physical features. Klose reports 134 cases (!) which have been operated upon by him; of these, 12 were children. He says 10 per cent. of all people have a movable cecum (!). Eighty per cent. of his cases were women, generally between the ages of twenty and forty-five years. There was always the colicky attacks which all writers have described, and which may occur at intervals from months to hours. Klose says there may be slight temperature rise, and in children a very rapid pulse (160 to 180), with fainting and collapse, is observed. In 60 per cent. of the cases pain was localized in the right side, in 24 per cent. over the course of the colon, and, in 16 per cent., all over the abdomen, especially in the gastric area. At the beginning of the trouble the stomach is but little affected, but when the chronicity of the condition is established, the gastric symptoms appear, not only during the attack, but in the interval. Food plays a cardinal role in the production of the attacks, also posture and exercise.

In the ileocecal region there is a localized resistance which may be felt in and between the attacks, and a tumor is palpable which may be pushed as high as the umbilicus. The mass has an air-cushion feel which Klose regards as characteristic. Gurgling, which may be heard by the patient or which may be produced only by palpation, is an important feature. Constipation is very common.

Regarding the differential diagnosis, certain gynecological conditions may cause confusion, but Klose says the diagnosis of hysterical pseudo-appendicitis and intestinal hysteria is no longer tenable in view of the knowledge of cecum mobile, and appendicular colic is nothing but a symptom of this. Biliary colic, floating kidney, and pyelitis are often difficult to exclude as far as the x-ray is concerned. Klose emphasizes that a retention of bismuth in the cecal region is characteristic of cecum mobile, if other signs are present. Incidentally, he advises the use of 20 grams of bismuth carbonate in 250 c.c. water, instead of the nitric acid salt.

In discussing the theories as to the causation of cecum mobile, Klose recalls that the pressure in the cecum is four times as great as in the

¹ Beitr. z. klin. Chir., 1911, lxxiv, p. 593.

descending colon, and that when there is stagnation of fecal material, the walls of the cecum are the first to stretch and hence typhlatonia is the first consequence of the weak and overstretched cecal wall. This is one theory, and two others are deserving of consideration, namely, hypertrophy of the intestinal wall resulting for some little understood mechanical hindrance, and catarrh of the cecum.

Klose's article is a masterly one, and is the best one which I have seen on the subject.

Dreyer¹ takes as his theme the questions whether a movable cecum is really a pathological condition, and if the operation, as described by Wilms (cecopexie), really brings about a new physiological condition. He studied 105 cases in the mortuary, and found a cecum mobile of all degrees in 67 per cent. of the cases. He finds it difficult to bring such a frequent phenomenon in the category of the pathological. As far as the physiological features of the operation are concerned, Dreyer thinks it is apt to be dangerous in women who are to bear children, as the normal pregnant uterus pushes the cecum above it near term, and any fixation of the cecum must be regarded with some hesitation.

The question has been made the subject of a scathing criticism by Crämer,² who insists that there is no disease entity of cecum mobile, and he believes what writers have described as a symptom-complex should be called typhlitis. The disease is certainly not a surgical condition, unless some complications make their appearance. Crämer says operation has never helped his cases and he does not believe it can ever help. He prefers medical treatment to combat the intestinal catarrh, constipation, putrefaction, the change in intestinal flora, the local inflammation, and to regulate the bowel movements. These can be treated by appropriate diet, disinfection of the intestinal tract from above and below, bowel movements without irritation, rest in bed, cold compresses, local massage, vibratory movements, and electricity.

The diet should be mixed, and the vegetables should be decreased in amount where microscopic or macroscopic particles appear in any great number. Knowledge as to the functions of the stomach is of great help in regulating the diet. Fruit is absolutely interdicted. If there is much intestinal fermentation, the various fermented milks, Yoghurt, Kefir, buttermilk, or lactobacillin tablets. The best means to secure evacuation of the bowels is by oil enemas. Disinfection of the intestinal tract may be attempted by ammonium ichthyol, menthol, guaiacol given in hardened capsules. Crämer has seen good results from ichthalbin in large dose, and from naphthalin. Atropin is indicated for the cramp-like forms. As far as disinfection of the bowel from

¹ Beitr. z. klin. Chir., 1911, lxxv, p. 113.

² Münch. med. Woch., 1912, pp. 627 and 709.

below is concerned, he gives thymol injections, 1 to 1000, very warm (42° to 45° C.), instructing the patient to retain them a long time.

For the intestinal catarrh, in addition to the diet, mineral water taken warm is recommended, especially those containing sodium chloride—Homburg, Wiesbaden, Kissingen, König Ludwig's Quelle. The prognosis should be guarded, as one cannot promise much on account of the chronicity of the trouble.

It is always well to have a warning note sounded by someone qualified to do the sounding and to be listened to, and this paper of Crämer's is most opportune. It presents the subject in an entirely different light from the papers offered by the surgeons, and should be carefully read by those who have had a leaning toward cecum mobile as a disease in itself.

Haussmann,¹ in righteous indignation insists that the priority in calling attention to cecum mobile be given him, as he² described the condition in 1904, and Wilms in 1908. He also refers to his method of palpation, which was published in *Archiv f. Verdauungskrankheiten*, 1907, xiii, 394, and later in *Deutsch. med. Woch.*, 1910, p. 1956, as the best method to use in diagnosing the abnormality. He makes the statement also that the term "cecum mobile" was used by v. Mantouffell before Wilms or Haussmann ever employed it.

Other papers devoted to the question of chronic appendicitis and cecum mobile have been published by Klemm.³

Perisigmoiditis. During his work as pathologist in one of the hospitals in Hamburg, Simmonds⁴ has been struck with the variations in the shape, size, and position of the sigmoid which are even discovered in children. Some flexures are seen which seem hardly worthy of the name, being only a few centimeters in length, others again are a half meter long, megalosigmoid, the apex of which often reaches to the right hypogastrium, to the stomach, and to the liver. According to the length of the sigmoid, there are differences in the peritoneal covering so that the short sigmoids often have no mesentery, the bowel being then only slightly movable, while the longer flexures have a decided mesosigmoid, and the gut is so freely movable that often two loops are seen instead of one. Simmonds directs attention to all inflammations of the mesosigmoid, consisting of circumscribed areas of peritoneal thickening. On microscopic examination, he never found any evidence of an exudative process, but only thick connective tissue, either full of cells or poor in the same. He regards these areas as scar tissue formation, brought about by mechanical irritation of the peritoneum at these places.

¹ *Deutsch. Zeitsch. f. Chir.*, 1911, cx, p. 299.

² *Berl. klin. Woch.*, No. 44.

³ *Archiv f. klin. Chir.*, 1911, xcv, p. 558; Wilms, *ibid.*, p. 58.

⁴ *Archiv f. Verdauungskrankheiten*, 1911, xvii, p. 475.

Inflammations of the mucous membrane of the sigmoid are seen often, but a rare group of cases shows inflammatory lesions not in the mucosa but in the outermost layer of the sigmoid—chronic inflammatory sigmoiditis, which may give rise to strictures of the sigmoid. He quotes a case of a man, aged fifty-five years, who had suffered for a long time from constipation, which had assumed such proportions that a stenosis was feared. In view of the age of the patient, the absence of earlier intestinal lesion, gradual increase in the stenosis symptoms, the palpable tumor in the left hypochondrium (although there was no occult blood), the diagnosis of carcinoma of the splenic flexure was made and resection advised. At operation, a sausage-shaped tumor was seen, closely adherent to the surrounding structures, and the flexure was excised. A closer examination of the tumor showed it to consist of inflammation of the outer walls with intact mucosa, the stenosis being caused by scar-tissue formation in these outer layers. Within the scar tissue a cavity was found, filled with granulations, pus, and bacteria. This, Simmonds believes, offers proof of a chronic perisigmoiditis with stricture formation caused by infection from the bowel. A second case similar to the above is also reported by Simmonds.

The diagnosis of these conditions is always difficult, and is only possible when observation extending over years precludes the possibility of the tumor being of a malignant neoplasm. Simmonds lays importance of the presence of occult blood in the feces in the latter, a finding which I believe is one of the most important in the diagnosis of cancer of the gastro-intestinal tract.

Tuberculosis of the Intestines. Cruice¹ has made a statistical study of the cases occurring in the Phipps Institute, and concludes that perforation of the intestines in chronic pulmonary tuberculosis, occurs in from 1 to 5 per cent. of the cases, but that there is such difficulty in the diagnosis that recognition of the condition is possible in only a small proportion of the cases.

In experimenting with tuberculosis, Kiralfi² found, after injection of tuberculous urine into a guinea-pig, a most peculiar form of tuberculosis. This consisted of solitary tubercles beneath the serosa of the small intestine without any changes in the other organs of the body. Why the bacilli should have lodged in this locality, the author is at a loss to explain; but it is of great importance to know that experimental tuberculosis may take this form, in order that when "negative" organs are found, the examination of the intestinal tract may not be neglected.

Somewhat along the same line, but having more clinical interest, is a paper by Bretschneider.³ He reports in full 2 cases, which were

¹ American Journal of the Medical Sciences, 1911, cxlii, p. 683.

² Berl. klin. Woch., 1911, p. 2247.

³ Ibid., p. 2249.

thought to be essential pernicious anemia, but which autopsy revealed to be secondary to latent tuberculosis of the intestines and mesenteric glands. The blood picture was characteristic. In one case there were all the signs of what Widal has described as acquired hemolytic icterus, making a distinction between this and the congenital form. He says that it is unwise to state that symptoms of pernicious anemia belong in the symptomatology of tuberculosis, as the rarity of the features mentioned above precludes such classification.

Sarcoma. Goto¹ has made a complete literary review of the subject of ileocecal sarcoma, and draws the following conclusions: It is more common in males after fifty years of age. From the pathological standpoint it is expressed as circumscribed tumors which frequently lead to stenosis. Symptomatically there is rapid emaciation, a tumor which is readily movable on palpation, and which grows very rapidly, with signs of stenosis. It is very difficult to make a diagnosis between sarcoma and carcinoma. Prognostically, sarcoma of this region is much more favorable than in other localities.

X-ray Examination of the Intestine. Kraus² suggests that oxygen be used instead of bismuth for the x-ray examination of the large intestine. His technique is to give an enema the day before, and on the day of the examination. After the bowels have been thoroughly opened, the patient is laid on the left side, and a tube inserted for 15 to 20 cm., and connected by a glass tube with the oxygen container. He is careful that the oxygen is introduced only in small quantities and without much pressure. The filling of the bowel takes about five minutes, and he claims there has been enough oxygen introduced when there is tympany over the entire large intestine. At this point the patient has a slight tense feeling, but no pain, and the musculature begins to be stretched. The use of a manometer to regulate the pressure of the oxygen is totally unnecessary.

Voit³ publishes the clinical examination, with x-ray findings, in a case of *situs viscerum inversus totalis*.

Absorption from the Large Intestine. The question of absorption from the large intestine has been one of great interest to clinicians on account of the common use of nutritive enemas. Some there are who claim that they are valueless, and some lay great importance on their employment. We know that water is absorbed, as there is increase of urine and gain of weight (Roux). Also crystalloids are taken up, as is shown by the iodine reaction in the saliva a few minutes after iodine salts have been introduced into the rectum. Nitrogenous material is surely absorbed, as Mochisuki found increase of uric acid in the urine after an enema rich in purin bases, but the hope generated

¹ Archiv f. klin. Chir., 1911, xcv, p. 455.

² Beitr. z. klin. Chir., 1912, lxxvii, p. 564.

³ Berl. klin. Woch., 1911, p. 1632.

by this knowledge soon faded when it was learned that one could not be kept in nitrogen balance on nutritive enemas alone. Glucose in dilute solution is readily absorbed, and so is starch when it has previously been acted upon by ferments.

Diena¹ has approached this question by an entirely new route, I believe. He produced, in a dog, an artificial anus, and then, at some distance below this, a fistula, so that food could be introduced by means of the latter, and withdrawn from the rectum without being contaminated by the feces. After feeding, he washed out the intestine at the end of two hours, and was then able to study the amount of liquid absorbed. For this purpose he used hypo-, iso-, and hypertonic solutions of glucose, urea, and sodium chloride, and found that the osmotic pressure of the liquid plays a great role in the absorption by the large intestine. If the solution is hypotonic there will be a very rapid absorption, if isotonic, water is scarcely absorbed, although substances are readily taken up. If hypertonic, the passage of water and solids into the intestine will be very rapid, more so than in the foregoing two, but there will be intense irritation with the production of large amounts of mucus.

The objection that these experiments do not coincide with the clinical experience that isotonic solutions *are* absorbed, Diena meets with the reply that such solutions are given only to dehydrated patients. In practice, with rectal enemas, one gives no thought to the question of osmotic pressure, and this is why there is so much colonic irritation with their use. The practical lesson which may be learned from this paper is that if dehydration is to be combated, a hypotonic solution should be used; if foodstuffs are to be introduced, however, then they should be made up in an isotonic solution, which will render them easy of absorption without causing any irritation. A rapid elimination of water can be brought about by the use of a hypertonic solution.

Although food is absorbed somewhat readily, and water with great rapidity, bacteria have been shown by Ravenel and Hammer² to be slow of absorption from the rectum and with no degree of uniformity.

Use of Agar-agar as a Vehicle for Medicine. Following the lead of Schmidt, Einhorn³ suggests that agar-agar be used as a vehicle for various drugs. It is unnecessary to recall the action of agar-agar in producing bowel movements, as this is well known. Einhorn believes it can be used in diarrhea and in constipation, and he makes the following suggestion:

PREPARATION OF THE AGAR REMEDIES. "The medicinal agent is dissolved in a boiling agar water solution, thoroughly mixed, then evaporated to the original dry agar volume. By knowing the quantities

¹ Arch. d. Mal. d. l'App. Dig., 1911, v, p. 425.

² Journal of Medical Research, 1911, N. S., xix, p. 513.

³ American Journal of the Medical Sciences, 1912, cxliii, p. 230.

taken, the medicinal agent can be standardized; the impregnated agar is then ground up into flakes.

1. Phenolphthalein-agar. Each level teaspoonful (1 dram) represents 0.03 gm. (gr. $\frac{1}{2}$) phenolphthalein.

2. Rhubarb-agar, $\mathfrak{zj} = 1$ c.c. (\mathfrak{M}_{xvi}), fluidextract of rhubarb.

3. Calumba-agar, $\mathfrak{zj} = 2$ c.c. (\mathfrak{M}_{xxxii}), fluidextract of calumba.

4. Gambir-agar, $\mathfrak{zj} = 2$ c.c. (\mathfrak{M}_{xxxii}), compound tincture of gambir.

5. Tannin-agar, $\mathfrak{zj} = 0.03$ gm. (gr. $\frac{1}{2}$) tannic acid.

6. Simaruba-agar, $\mathfrak{zj} = 1$ c.c. (\mathfrak{M}_{xvi}) tincture of simaruba.

7. Myrtill-agar, $\mathfrak{zj} = 1$ c.c. (\mathfrak{M}_{xvi}) tincture of myrtill.

8. Ipecacuanhæ-agar, $\mathfrak{zj} = 1$ c.c. (\mathfrak{M}_{xvi}) tinctura ipecacuanhæ.

9. Sumbul-agar, $\mathfrak{zj} = 1$ c.c. (\mathfrak{M}_{xvi}) fluidextract of sumbul.

Phenolphthalein and rhubarb-agar (1 and 2) can be used for constipation. One teaspoonful of either twice daily, after breakfast, in water, is the average dose.

Calumba-agar (3) is useful in colitis, with normal defecation. Dose \mathfrak{zj} three times daily, after meals, in water.

Gambir, tannin, simaruba, and myrtill agar (4, 5, 6, 7) are valuable in diarrheal conditions. Dose is \mathfrak{zj} three times a day. The myrtill-agar is useful in diabetes, especially if complicated with enteritis.

Sumbul-agar may be employed in neurotic intestinal disturbances, while Einhorn prepared the ipecac-agar for amebic dysentery, but had no occasion to use it.

DISEASES OF THE PERITONEUM

Disappearance of Liver Dulness. Berg¹ asserts that the liver dulness disappears when there is free air in the peritoneal cavity, from above downward and from below upward, the middle of the area of hepatic dulness being the last to be replaced by tympanitic resonance. In tympanites, on the other hand, the progress of the disappearance of liver dulness is from below upward only.

DISEASES OF THE LIVER

Functional Tests. The manifold functions of the liver would seem to offer a fertile field for the growth of diagnostic tests, and it is probably due to the multitudinous activities of this wonderful workshop that we are deluged with papers relative to these functions, and hence confused. A rather new path is blazed by Falk and Saxl,² and Hess and Saxl, who point out that the amino acids and peptid nitrogen in the

¹ Medical Record, 1911, lxxx, p. 820.

² Zeitsch. f. klin. Med., 1911, lxxiii, pp. 131 and 325.

urine are increased in amount after the administration of glyccoll, which in health is followed by no such increase. Comparative studies of this method and of other methods recommended for the functional diagnosis of hepatic cirrhosis were favorable, and he believes the new method is as trustworthy as urobilinuria and alimentary levulosuria.

Castex¹ studied the amino acid output in health and in disease. In 2 cases of pneumonia, one with recovery and the other ending fatally, the amino acid content was high and low respectively. A high figure was noted in all cases of diffuse liver disease, in febrile tuberculosis, and, highest of all, in a case of pseudoleukemia.

The question of the chloride excretion in nephritis has been so thoroughly thrashed out, and the output in liver diseases so shabbily treated, that we welcome an article by Burnham.² He studied one case of alcoholic cirrhosis and noted the following points:

1. There was a constant and continuous decrease in the elimination of water and chlorides.

2. A dose of 10 grams of salt was followed by a retention of water and a corresponding increase of body weight.

3. A diet of low salt content may be of service in the ascitic stage of cirrhosis, thus allowing time for the desired collateral circulation.

I think the last statement has been repeatedly made by the French school, and although I can recall no specific papers devoted to the question, I believe such have been published. Within the last year I tried the effect of a salt-poor diet in a young woman afflicted with ascites, probably secondary to portal thrombosis. For a time there seemed to be some improvement, but this was not noteworthy. I should most cordially recommend the use of such a diet, however, in any case of transudation or exudation.

Churchman³ states that he found alimentary levulosuria in certain healthy people, but he believes, nevertheless, that it is a good test of hepatic insufficiency. A few years ago I⁴ made a series of investigations with levulose, and was convinced of its great value. I have not seen a positive reaction in persons with normal livers, however.

Myers⁵ has had favorable results with levulose, and also believes in the value of tests for urobilinogen.

Gilbert and Lereboullet⁶ have studied the urine output in diseases of the liver, and they believe that much significance is attached thereto. This delayed urine excretion they call "opsiuria." The "alimentary water test," if I may use such an expression, is made as follows: A

¹ Abstract in Journal of American Medical Association, 1912, lviii, p. 828.

² Journal of American Medical Association, 1912, lviii, p. 851.

³ Johns Hopkins Hospital Bulletin, 1912, No. 251, p. 10.

⁴ Journal of American Medical Association, December 18, 1909, liii.

⁵ New York State Journal of Medicine, 1912, p. 181.

⁶ Archiv. des Mal. d. l'App. Dig., 1912, vi, p. 1.

control period is made with the patient fasting and in bed for a period of six hours, collecting the urine at the end of each hour. The next day 500 c.c. are given, and the same technique observed.

Venous Hum in Cirrhosis of the Liver. Henry¹ reports an interesting case of cirrhosis of the liver in which a loud venous hum was heard over the xiphoid cartilage. The author agrees with Charcot that venous hums in cirrhosis are of favorable portent, and suggests the corollary that the disappearance of such murmurs is of evil omen.

Congenital Obliteration of the Bile Ducts. Howard and Wolbach² report a case which brings the total number of published cases to 76. As a predisposing cause, syphilis of the parents seems to play a great role, and it is noteworthy that several authors have remarked a tendency for more than one child of the same parents to have icterus. This icterus is sometimes noted on the day of birth, but perhaps not until the child is two weeks, or more, old. The jaundice is always progressive, and sooner or later becomes marked, being of a deep greenish hue. The urine always contains bile. The color of the stools varies, depending on the degree of obstruction. If the latter is not complete, the stools may be green or brown, but when the obstruction is extensive, the color varies from white to cream, and, in some cases, the stools look like white lead. The greenish color, Howard and Wolbach say, may be due (1) to a mixture of the stool with bile-stained mucus; (2) the result of the administration of mercury, and (3) the influence of microorganisms. Vomiting is a rare feature. In nearly 50 per cent. of the cases there are hemorrhages into the skin and conjunctivæ, or from the mucous membrane of the nose, gastro-intestinal tract, and umbilical cord. There is but little emaciation at first, although the longer the infant lives the more pronounced does this become. The duration of life is longer than a month. The theories as to the cause of obliteration receive full consideration, but our authors have not evinced a preference for any one.

It seems to me that Lavenson's views are the most acceptable, namely, that atresia of the bile ducts is the primary condition and the cirrhosis but secondary. (See Experimental Production of Cirrhosis.)

Experimental Production of Cirrhosis. Biliary cirrhosis has been produced experimentally by Richardson³ by ligating the duct, thus causing biliary obstruction. The changes appear as early as twenty-four hours after the ligation, and are very marked after four weeks. At the end of this time, the connective tissue of the portal spaces has a young appearance, in no place possessing the dense scar-like appearance of old cirrhosis cases in man.

¹ American Journal of the Medical Sciences, 1912, exliii, p. 72.

² Archives of Internal Medicine, 1911, viii, p. 557.

³ Journal of Experimental Medicine, 1911, xiv, p. 401.

Cholelithiasis. Scheel¹ believes that the same factors operate in men as in women, and that changes in metabolism which accompany the cessation of the sexual functions in both men and women are favoring influences. When the latter coincide with a casual infection of the biliary passages, there is liable to be a production of gallstones. He says this assumption explains why there is only a single generation of gallstones. In his 406 cases the women's curve rises from 5 to 10 per cent. between the ages of twenty and thirty years, then to 15 per cent. between thirty and forty years, and then it jumps to 25 per cent. before fifty years, and to 35 per cent. by the age of seventy years. The men's curve parallels it almost perfectly, only adding twenty years to each age. In 67 per cent. the bile passages were apparently not pathological—in 74 per cent. of the cases with multiple stones, and in 54 per cent. with single stones. If there had been an infectious process, it had healed without leaving a trace. In 75 of 133 pathological cases, there were evidences of an old, practically healed cholecystitis; the walls of the gall-bladder were thickened or shriveled, with more or less adhesions. There was cancer in the gall-bladder in 5 cases.

An excellent article covering all phases of the subject is that of Walton.²

Aschoff³ says that cholesterin stones are found exclusively in sterile gall-bladders, and that the combination calculi occur only in cases of inflammation. By a combination calculus is meant a peculiar form, having in the centre a pure cholesterin nucleus and in the periphery a mantle, so to speak, of stratified cholesterin pigment and lime. In other words, the so-called pigment stones depend on *infection* for their production, but a combination stone can be formed by incrustation of pigment, and an already formed cholesterin calculus. The combination stones have been found by Aschoff to occur in 21 per cent. of all cases, and cholesterin stones in 6 per cent., so that 27 per cent. of all cases of biliary calculi occur without infection. Riedel⁴ contributes a lengthy clinical article to the aseptic calculi, in which he devotes considerable discussion to the symptomatology and differential diagnosis of the condition.

INTRAHEPATIC CALCULI. Although the diagnosis of this condition is impossible *intra vitam*, the morbid process presents some interest, as it is said to occur in 8.3 per cent. of the gallstone cases which come to autopsy. Noguchi⁵ reports an unusual case in which the stone was felt in the liver at operation and was successfully removed. The clinical diagnosis was stone in the common duct, but, as none was

¹ Abstract in Journal of American Medical Association, 1912, lviii, p. 74.

² Annals of Surgery, 1911, liv, pp. 83 and 176.

³ Med. Klin., 1912, p. 4.

⁴ Münch. med. Woch., 1912, p. 8.

⁵ Arch. f. klin. Chir., 1911, xevi, p. 633.

found, a thorough palpation of the liver revealed the cause of the symptoms—a solitary intrahepatic calculus.

Primary Carcinoma of the Liver (Hepatoma). This is made the subject of a thorough pathological study by Yamagiawa.¹

Loeper² calls attention to the rapid death seen in cases of cancer of the liver, which, he says, is due to hemorrhage or infectious complications; sub-acute icterus produced by infectious hepatitis; auto-intoxication.

Abscess of the Liver. The following case of McKeechnie³ occurring in a boy, aged fourteen years, is worthy of attention. He had coughed up pus night and day for five years, from a perforated liver abscess. The condition was completely cured by hanging him over the edge of a table, head downward, the whole body hanging vertically upside down, the legs and thighs lying on the table at right angles to the body. In this position he was made to cough and squeeze his chest until no more pus came out, which completely emptied the abscess cavity. The process was repeated five or six times a day. At first he got very large quantities of pus, but it rapidly diminished, and in about six weeks he was cured.

Milne⁴ makes a subdivision into “sub-acute liver atrophy” of those cases which have had, apparently, more recuperative power, and in which the hepatic destruction has not been so extensive. The clinical course is less rapid, but there is always a fatal outcome, and, pathologically, one can trace a direct connection between acute atrophy, sub-acute atrophy, and cirrhosis of the liver in all its types.

Acute Yellow Atrophy of the Liver. A case of acute yellow atrophy with autopsy findings is reported by May.⁵

An interesting case of hemochromatosis or pigmentary cirrhosis of the liver associated with glycosuria, and occurring in a woman, is reported by Robert.⁶

Microscopic Examination of Bile. Petry⁷ has suggested that the bile be examined microscopically, as he believes that disease of the gall-bladder must be associated with morphologic pathologic material, analogous to that formed in the urine and sputum in diseases of the genito-urinary and pulmonary tract respectively. He uses the oil breakfast of Volhard, and gives 200 c.c. of olive oil on a fasting stomach, extracting it in from thirty to forty-five minutes, the patient during this time remaining in bed.

In a case of cholelithiasis he found microscopic bilirubin-lime stones,

¹ Virchow's Archiv, 1911, cevi, p. 437.

² Arch. d. Mal. d. l'App. Dig., 1911, v, p. 469.

³ Lancet, March 30, 1912, p. 865.

⁴ Archives of Internal Medicine, 1911, viii, p. 639.

⁵ Australasian Medical Gazette, 1911, p. 377.

⁶ British Medical Journal, November 11, 1911, p. 1248.

⁷ Wien. klin. Woch., 1911, p. 927.

and, at operation, a gallstone was found in the common duct, but none in the gall-bladder. In two cases of multiple calculi in the gall-bladder the same concrement formation was obtained.

Although this work is but in its inception, I am impressed with the idea, and it is certainly deserving of much consideration. Perhaps the morphological constitution of the bile will prove to be a valuable aid in the diagnosis.

Jaundice. PATHOGENESIS OF CATARRHAL ICTERUS. The present opinion regarding the anatomical findings in catarrhal icterus seems to be the one formulated by Virchow, and his may be summed up as follows:

1. There is a swelling of the duodenal mucous membrane about the orifice of the bile duct.
2. Presence of an epithelial mass in the intestinal portion of the common duct.
3. Widening of the remainder of the common duct associated with a bile-stained appearance of the duct, while at the lowermost end there is constriction with no coloration.

Neugebauer¹ discredits the belief that a duodenal catarrh alone is responsible for the icterus, as so many clinicians hold, and this he bases on sound reasoning, it seems to me. Every physician has experienced many cases of gastro-intestinal catarrh where there has been no icterus, and, furthermore, he cites a case of jaundice in which, at autopsy, there was no catarrh. There are certain cases, furthermore, in which the intestinal trouble is so slight as not to be complained of by the patient. Also there are many cases of icterus exhibiting stercobilin in the feces, so that there can be no total biliary obstruction. The severe constitutional symptoms (fever, splenic tumor, albuminuria) point away from the purely local condition, and Neugebauer says that the epithelial plug described by Virchow is an index that the pressure in the biliary tract is lowered by altered hepatic functions so that the transport of epithelium is interfered with. The altered hepatic function is demonstrated by lowered galactose assimilation.

Minkowski's view, which was offered after Virchow, was to the effect that there is an insufficiency of the hepatic cells without any mechanical disturbance of the flow of bile, but Neugebauer dismisses this as improbable.

Forty-six well tabulated and carefully analyzed cases reported from v. Neusser's clinic led him to the conclusion that with the hepatic insufficiency there is a mechanical feature which, by lowering the intra-hepatic pressure, so to speak, causes stagnation of bile. As causes of the changes in the hepatic cells he mentions acute and chronic infections, venereal diseases, alcohol, heart disease, and pregnancy.

¹ Wien. klin. Woch., 1912, p. 514.

EPIDEMIC CATARRHAL JAUNDICE. Pinninger¹ reports 8 cases occurring in an institute where 2000 children, of ages varying from a few months up to sixteen years, are cared for. In this institution the children are segregated into five houses, and it was in only one of the latter that the outbreak arose. There was nothing remarkable about the disease. It consisted of an attack of obstructive jaundice, a variable degree of fever, some feeling of malaise, and, in 3 cases, enlargement of the liver, without any tenderness, however. In 2 of the cases, jaundice was not present to the full extent—that is, there was no change in the color of the urine and stools. There was no history of antecedent gastro-intestinal trouble. Many writers have thought the cause of the epidemic was to be sought in bad food, or exposure, but Pinninger says that the fact of the disease being limited to one department of the institution only, suggests that the disease was presumably infectious. The period of incubation is probably between fourteen and twenty-one days.

Isolated cases of the same kind are reported by Holderness,² Williams,³ Cambell,⁴ and McCall.⁵

FAMILIAL JAUNDICE. Four cases of icterus occurring in the same family are reported by Pel.⁶ As symptoms, the following are the most important: There is more or less pronounced icterus, with bile in the urine, but with no discoloration of the stools. There is a splenic tumor, but no enlargement of the liver, and, apart from a slight degree of anemia, there is no impairment of the general health. Chauffard expresses it well when he says “plus ictérique que malades.” There are, however, irregularly appearing attacks of pain in the right hypochondrium, accompanied by vomiting, fever, and diarrhea. These symptoms, which resemble very closely hepatic colic, are induced, Pel believes, by pigment stones or inspissated bile in the gall-bladder. From time to time there is an exacerbation of the anemia, and increase in the degree of jaundice and of the splenic enlargement.

In regard to the blood examination, in addition to the anemia, there is a moderate leukocytosis with anisocytosis and polychromatophilia. There is a marked lowering of the resistance of the red blood cells to hypotonic salt solution, and they also undergo more rapid hemolysis with other agents. The blood serum contains bile pigments which impart to it a dark color. The prognosis is usually good.

As far as the pathology is concerned, there is no hepatic cirrhosis, although the liver contains large amounts of pigment. Siderosis of the spleen and kidneys is observed.

¹ British Medical Journal, November 18, 1911, p. 1353.

² Ibid., December 9, 1911, p. 1533.

³ Ibid., December 23, 1911, p. 1653.

⁴ Ibid., December 30, 1911, p. 1695.

⁵ Ibid.

⁶ Ueber familiären hämolytischen Ikterus, Deutsch. Arch. f. klin. Med., 1912, cvi, p. 239.

RECURRENT JAUNDICE. In the *Practitioner* (1911, lxxxvii, 791), Guthrie reports the case of a girl, aged eleven years, who was subject to attacks of recurrent jaundice, associated with hemoptysis, splenomegaly, and pyrexia. There was also a peculiar purplish tinged coloration over the abdomen. The condition having existed for two years, there was marked secondary anemia, and, although the objective findings did not suggest a syphilitic taint, the Wassermann reaction was positive. Antispecific treatment was not instituted, but the patient improved on general measures, which leads Guthrie to the opinion that despite the positive Wassermann reaction, the child was not syphilitic.

It has been a question of some discussion whether hereditary syphilis was accompanied by jaundice; Hochsinger,¹ claiming that in infants, hepatic syphilis never produced jaundice, while Heubner and Finkelstein hold the opposite view. Rosenberg² has taken up the debate, and publishes 4 cases of infants, all of whom suffered from icterus, and 3 subsequently dying. Complete postmortem examination was made in each case. In the case of the infant who recovered, cure was brought about by active antisyphilitic treatment, and in 1 of the cases which eventually died, marked improvement was observed with mercury. These 2 cases were presumably ones of cholangitis gummosa. Rosenberg reports his anatomical findings, which comprise obstruction of the biliary passages by a gumma of the portal vein, peripyllephlebitis gummosa, and parenchymatous degeneration of the liver cells.

A very interesting article on the causation of the slow pulse seen in icterus is offered by Lian and Caen,³ but this will undoubtedly be dealt with in the appropriate section of PROGRESSIVE MEDICINE.

DISEASES OF THE PANCREAS

Chronic Pancreatitis. The industry of Arnstein⁴ in collecting 437 papers published from 1906 to 1911, is to be commended, and especially the short, concise summary which he appends to his article. I translate these conclusions:

"1. *Etiology.* The main role in the causation of chronic pancreatitis is played by infection from the biliary tract, which infection is spread by the lymph channels and becomes localized in the head of the pancreas (Riedel's tumor). A less frequent cause is obstruction in the pancreatic duct, chronic infections (lues, tuberculosis), intoxications (alcohol), and inflammation from contiguity. (Gastric, duodenal, and common duct ulcers, peritonitis.)

¹ Wien. med. Woch., 1896, Nos. 9 to 14.

² Deutsch. med. Woch., 1912, p. 756.

³ Archiv. d. Mal. du Cœur, 1912, p. 1.

⁴ Centralbl. f. d. Grenzgeb. d. Med. und Chir., 1913, xv, p. 90.

"2. As regards the *pathology*, there are various degrees of change observed. The islands of Langerhans may be affected (diabetes), and there is a special form called "pigment cirrhosis" which is seen in hemochromatosis (bronzed diabetes).

"3. Of *clinical symptoms*, the most important are vomiting, diarrhea, emaciation, pain in the epigastrium, and anemia. Of great importance is a palpable tumor in the pancreatic region, icterus (50 per cent. of the cases), steatorrhea, and creatorrhea. Diabetes is seen only when the islands are seriously involved. As regards complications, cholelithiasis, acute hemorrhagic pancreatitis, pancreatic calculus, and pancreatic cyst are the most frequent. Functional tests are of little value.

"4. Chronic pancreatitis, *sui generis*, is a rare disease, but is common when associated with cholelithiasis.

"5. Therapy should be directed toward the cause. In the cases which are not caused by a biliary infection, pancreon seems to be of value, but operation should be recommended when internal medication proves to be without benefit. Operative mortality is 20 per cent."

Deaver¹ discusses chronic pancreatitis in associated with gallstone disease. In every one of 73 cases of pancreatitis, he was able to find stones, or changes in the gall-bladder or biliary ducts. Although gallstones are commonly found, it is not necessary that stones be present in order to have infection of the pancreas or its ducts from the biliary apparatus, as in 12 of his cases no stones were found, nor did the history indicate that any had been discovered. There was present, however, a more or less marked non-calculous cholecystitis and cholangitis. It is not fair to assert that, in every instance, the inflammation is transmitted from the bile passages, and Deaver lays emphasis on the fact that the cases of pancreatitis unassociated with gall-bladder disease are generally seen in males. I shall mention this point again in the article which follows this abstract. He explains this on the basis of an ascending infection from the intestine; but, while admitting that there is such a thing as a primary uncomplicated pancreatitis, he nevertheless believes that the majority of cases of chronic pancreatitis are caused by previous cholecystitis and cholelithiasis.

The disease is essentially a disease of adults, the average age being forty-four years. The first symptom is usually a disturbance of digestion, expressed as discomfort in the abdomen, or pain after eating, and flatulence. These symptoms are especially induced by eating carbohydrates. The pain complained of is not characteristic, there being no periodicity connected with it. Nausea, vomiting, constipation, and jaundice are seen, but, as Deaver says, these are symptoms of biliary disease as well as of pancreatitis. The physical examination is unim-

¹ Journal of American Medical Association, 1911, lvii, p. 11.

portant, save that in thin individuals the pancreas may be a very tender movable organ. Glycosuria is infrequent on account of the preservation of the islands of Langerhans. The Cammidge reaction he has found constantly in acute pancreatitis and in the severer grades of chronic pancreatitis, although it is not constant in chronic pancreatitis. The stools are typical in the late stages of the disease only, and Deaver lays importance on the presence of undigested meat fiber, excess of neutral fat and fatty acid with presence of stercobilin. He has no faith in tests for ferments in the stools, urine, and gastric contents, and ridicules duodenal tubes and buckets as "ingenious toys" whose chief function "appears to be the production of income and the delay of surgery."

Corroboration of Deaver is afforded by a very instructive illustration accompanying Franke's¹ article on the relation between the gall-bladder lymphatics and the pancreas. This illustration shows conclusively how the network of lymph channels invades the head of the pancreas, and Franke points out how readily an inflammation of the latter can take place from a gall-bladder infection.

I read Weichselbaum's² article on the association of chronic pancreatitis and chronic alcoholism with a great deal of interest. Lando,³ it will be recalled, found in 33 cases of hepatic cirrhosis, pancreatitis 33 times; 15 confessed to an abuse of alcohol, and 18 denied over-indulgence. Weichselbaum, to exclude what appears to be a very close relation between fibrosis of the liver and the pancreas, selected cases of chronic alcoholics where no hepatic cirrhosis existed, and where there was no disease in the history which might play a role. Twenty-seven cases were studied, 15 of whom came to the hospital with delirium tremens, and died of pneumonia or of some other disease. The majority of the patients were of middle age.

Microscopically, the pancreas showed fatty infiltration, and the glands weighed from 50 to 141 grams. On microscopic examination, only 2 organs showed no change in the structure, but in 25 cases there was interlobular connective-tissue proliferation rich in spindle cells and mononuclear round cells. There was marked congestion of the bloodvessels. These changes were seen especially in the head and tail. The interlobular tissue, on the other hand, being only occasionally affected. In 9 cases the islands of Langerhans were degenerated, and in all of these there was diabetes during life. In 1 case, isolated islands were affected, but there was no glycosuria in this instance. In the other cases some islands were indurated, but this was secondary to encroachment of the interlobular tissue on the peri- and interacinar connective tissue. In 17 of the 27 cases there was sclerosis of the arteries,

¹ Deutsch. Zeitsch. f. Chir., 1911, iii, p. 539.

² Wien. klin. Woch., 1912, p. 63.

³ Zeitsch. f. Heilk. Abt. f. path. Anat., p. 906.

which, in the majority of cases, were the only vessels in the body affected. Weichselbaum concludes from these studies that alcohol can cause a chronic intralobular pancreatitis, which in some instances can extend to the islands of Langerhans. Clinically, the condition cannot be recognized.

Cannot, then, alcohol be suspected as an etiological factor in some of the cases of pancreatitis unassociated with biliary disease? Deaver gives no data regarding alcohol abuse in his cases, but the fact that they were men of middle life, and had no other etiological factor, makes one wish that he had spoken of this habit. Weichselbaum's paper is most valuable, and is another evidence of the many bodily structures which are invaded by alcohol.

Pancreatitis and Mumps. An association between these two conditions has long been held to exist, on account of the abdominal symptoms which often make their appearance with parotitis. Whether the gastric symptoms are due to a pancreatitis, and not to an associated infection of the stomach, is not definitely known, although Cheinisse¹ believes that the former is never probable. This is borne out by functional tests by the occurrence of glycosuria in many cases, and by the rapid onset of diabetes mellitus in 2 cases shortly after the attack of parotitis.

Functional Tests of Pancreatic Insufficiency. Clinical tests of impaired secretory functions of the pancreas, like Banquo's ghost, will not down. All enjoy a brief period of basking, like a new-hatched, gaudy butterfly, in the warm sunlight of congenial publicity, but sooner or later the sun which has nurtured them passes on to other climes, and their authors

"Stand one day with the hope that is dead
Alone with the truth at last."

Former writers in PROGRESSIVE MEDICINE have faced the same difficulty which confronts me, namely, to judge wisely of the various methods, to censure or to praise, to condemn or to extol. Each method has its attendant admirers and each its detractors, and to steer a course through the rocky channels of this literary rapid is not an easy task. Personally, I am convinced more and more, that *that* method which purports to be an unfailing test of any condition is not worth the paper it is printed on. All that can be expected of anything, and all that should be the *sine qua non* of any method, is that it should be of assistance only. No method, test, or reaction in our long list of diagnostic procedures can be expected to replace the ordinary procedures of history taking and physical examination, and each test should be judged of in this light, namely, does it offer assistance, when

¹ Sem. Méd., February 21, 1912, p. 85.

taken in conjunction with the symptomatology, anamnesis, and examination of the patient? Too often clinicians, unfortunately the type of the latter are those of little practical laboratory training, condemn unheard a test which does not give them rapid, full, and infallible information regarding their patient's condition. Much abuse has been levelled at the so-called pancreatic tests, and some of those who aspire to the aristocracy of intellect, talk of such test with a final air of absolute pity for the deluded investigators, which is most disheartening to those who contribute their little mite, small as it is, to the cause of progress. Much work is being done and much work will be continued to be done, and out of chaos there must come light. Various writers advocate new methods, or advise modification of the old. Some, after experimenting with several, pin their faith to one or many. Did time permit, it would be most valuable to perform each reaction or test with each patient, for then we might glean some ray which would show us what footing we have. Pratt¹ shares this opinion; but he says, further, that functional tests may be positive in the absence of demonstrable anatomical changes in the organ. This is a remarkable show of faith in a test, and justifiable though it may be, yet it is an index of the extreme degree one will go in order to support a claim.

Werzberg² reviews fully the literature concerning the so-called clinical tests for pancreatic disease. He concludes, from his reading, that there is not much of practical value in the following: glycosuria, pentosuria, maltosuria, lipuria, Loewi's reaction (mydriasis after adrenalin instillation), Cammidge reaction, microscopic alteration in fat, oxaluria, indicanuria. Of doubtful value is alteration of the proportion between conjugate and total sulphates, also Sahli's glutoid test, Schmidt's nucleus test, and Ferreira's glucosid test. Werzberg says that while some of the above may assist in strengthening the diagnosis of pancreatic disease, yet none can be considered at all as specific.

Estimation of trypsin in the stool by means of casein he considers as a valuable index of pancreatic activity. This conclusion is based on a careful criticism of previous work and on careful animal experimentation. The same holds good for trypsin estimation in the stomach contents, although the author claims that hour-glass stomach confuses the results. Tests for diastase and lipase are doubtfully valuable.

The persistency with which Schmidt keeps his generally discredited nucleus test in the public eye seems deserving of a better test than this. From my reading I have gathered the impression that the test is practically useless, but one begins to "waver in his faith" when he sees periodically in some medical journal, an article by Schmidt himself,

¹ American Journal of the Medical Sciences, 1912, cxliii, p. 313.

² Archiv f. Verdauungskrankheiten, 1911, xvii, p. 533.

or by one of his school, offering what appears to be new proof of the validity of the test. Kashiwado¹ experimented with isolated nuclei obtained from thymus glands by digestion, subjecting the nuclei to gastric juice, pancreatic juice, and intestinal juice. The first acted very slowly, shrinking the cell structure without dissolving the nucleus entirely. The intestinal juice and glycerin extract from the mucous membrane of the intestine were without action. Pancreatic juice, even when not activated, dissolved the nuclei in a few hours.

Kashiwado was able, by a very simple method, to stain the nuclei, and these he fed to a dog in whom the pancreatic duct had been ligated. He later examined the feces, and found a slight diminution in the number of the nuclei, although he says this does not at all influence the value of the test. He offers no explanation of the attack on the nuclei in the absence of pancreatic juice, but I think it is probable that the author neglected to ligate all of the ducts in each dog.

Clinically, he says that if nuclei are found in the feces after the normal time allowed for the passage of food through the intestines, then there must be a marked lesion in the pancreas. He offers his test as an improvement over the original Schmidt method.

In the same number of the journal in which Kashiwado's article appeared, Schmidt (in whose laboratory the previous work was done) contributes an article on the same subject, whose results can be summarized as follows:

In organic disease of the pancreas (cirrhosis, atrophy, carcinoma, necrosis, inflammation), the nucleus test is positive when the glandular structure is completely destroyed or so badly injured that its secretory function is no longer active. When the pancreatic disease is not severe, the test is negative. In cases of diarrhea (functional disturbances) the test is temporarily positive—the nucleus test does not always run parallel with the ferment content of the feces and gastric contents.

Compared with the test diet, the test is as favorable; a positive test is to be expected when microscopic muscle rests are found, although this is not always the case, as it can sometimes be negative in these instances.

Leech,² in attempting a review of recent attempts to judge pancreatic activity by clinical tests, says he "must admit that, on the whole, the tests suggested are far from being satisfactory." The glutoid and salt tests are of little actual worth, and the nucleus test has but a doubtful value. The presence of voluminous light-colored stools, undigested meat fibres and of fat in large quantity, especially of neutral fat, are indications of advanced pancreatic disease only. He decries the Cammidge test, but expresses hope that there may be a future for

¹ Deutsch. Arch. f. klin. Med., 1911, p. 584.

² Practitioner, 1911, lxxxvii, p. 631.

the ferment tests. Heyn¹ believes that a low index of trypsin and amylopsin in the stools seems to point to pancreatic insufficiency.

Tileston² presents extensive studies in cases where there was presumably a complete absence of pancreatic juice from the intestine, and he concludes that the best indices of this condition are increased bulk of the feces, presence of visible fat, of microscopic fat droplets in large numbers, and of creatorrhea. He claims to have seen improvement in the absorption of fat and nitrogen by the administration of raw pancreas and pancreatic preparations.

Cambridge Reaction. Although the articles written on this reaction are more infrequent than was formerly the case, still occasionally a paper devoted to the subject makes its appearance. Schroeder,³ who it may be recalled did the first work in America with the Cambridge reaction, publishes a paper purporting to be one to show the present status of this test, but which fails in its object by neglecting to quote many papers. Schroeder's conclusions are those which I⁴ have always held, namely, that the reaction can in no sense be regarded as pathognomonic of pancreatic disease, but is only of value when taken in conjunction with the history and physical examination.

Weber⁵ investigated the chemical nature of the phenylhydrazin crystals, and concluded they represent the linking of a hexose with an unknown body. He regards the test as of value in the diagnosis of altered pancreatic secretion.

Hemorrhage and Fat Necrosis. It is a matter of general information that pancreatic hemorrhage and necrosis, and fat necrosis, are in some way connected with the pancreatic juice, but certain points remain as yet undetermined, for instance, whether these three conditions bear any relation one to the other, and what is the real cause, the entire juice or but a portion thereof? That the juice can be held responsible for these changes there can be no doubt, but there is some question if the pure pancreatic secretion, that is, secretion which is uninfluenced by the intestinal juices, can produce such profound alterations. Knappe⁶ has made these moot points the subject of an extensive research. In the first experiments, he ligated the ducts in the morning, and, after a few hours, the greatly dilated duct was punctured and secretion was allowed to flow out into the peritoneal cavity. As a result of the ligation, there was a slowing of the blood stream in the pancreas and in its vicinity. With this there were many areas of ecchymosis, but

¹ Journal of American Medical Association, 1911, lvii, p. 562.

² Archives of Internal Medicine, 1912, ix, p. 525.

³ Lancet-Clinic, August 26, 1911, p. 212.

⁴ Annals of Surgery, February, 1909, p. 183; International Clinics, 19th series, ii, p. 167.

⁵ Deutsch. med. Woch., 1912, p. 166.

⁶ Virchow's Archiv, 1912, ccvii, p. 277.

rarely necrosis. In other words, pancreatic juice can cause stasis, hemorrhage, pancreatic, and tissue necrosis in rabbits, the same as has been observed in man. The first step in the involved process seems to be stasis and hemorrhage, with secondary fatty degeneration.

Knapé made a second series of experiments, by ligating the duct, then injecting certain substances into this dilatation, and confining the foreign material to the pancreas by passing a second ligature about the duct. By a method of microscopy applicable to living animals, fine tissue changes could be observed. At first the capillaries were contracted and empty, then dilatation ensued, with subsequent slowing of the blood stream, and then ecchymosis. These changes were most marked after injection of bile. He was able to show that in simple ligation and in ligation after injection of foreign material there was an escape of pancreatic juices into the mesentery through the gland cells and tunica propria, due to rise in pressure in the organ. It is not a question of activating the pancreatic juice, as other authors have claimed, but is a matter of pure physics.

Bathing of the pancreas with watery extracts of pancreatic tissue was followed by exactly the same phenomena as in the foregoing except there was no necrosis. Solutions of albumin were inactive, but salts which are normally contained in pancreatic juice induced similar phenomena. Active trypsin in strong solution provoked tissue changes consisting of stasis and hemorrhage, while inactive trypsin did not, and Knapé believes that trypsin acts as a chemical and not as a ferment. Lipase and diastase were without effect. What the cause of the hemorrhage is was investigated by the author, who surmised it to be due to venous obstruction and not to any disease of the vessel walls caused by the pancreatic juice.

Knapé takes up the subject of fat necrosis which he believes is a sequence of the hemorrhages. The first signs of the former were seen after sixteen hours, and, in comparison to the areas of ecchymosis, were much less numerous. Fatty acid crystals were never seen, although other signs point to a splitting up of the fat molecule. He does not believe that the pancreatic juice alone is responsible, but holds that there may be a form of fat necrosis in which the pancreas plays absolutely no role. Autopsies have frequently shown fat necrosis with no lesion of the pancreas, and Knapé believes that the lipase of the lymph can cause it, provided there has been a previous stage of stasis and hemorrhage.

So much for experimentation. Knapé takes up the question of etiology of fat necrosis in man. Trauma is a prime cause, and causes diffusion of pancreatic juice by tearing of the tissues and by irritating the nerves of the bloodvessel walls, so that diapedesis results. He lays emphasis on venous thrombosis which, while it is held as a cause in lower animals, has not been regarded very seriously in man. Obstruc-

tions to the outflow of juice in the pancreatic ducts by any cause may produce fat necrosis.

Removal of Pancreas. The question of the effects of incomplete depancreatization in dogs has been made the subject of a complete, thorough, and painstaking research by Labbé.¹ The article comprises 62 pages of valuable material composed in the true French manner, which means that but few words are wasted. While, of course, the paper makes its direct appeal to workers in research medicine, its message may not be malapropos when summarized in these pages.

1. A dog which has been subjected to a partial pancreatectomy (loss of $\frac{6}{7}$ of the organ) can live for several months when fed regularly on meat. It loses weight slowly (50 per cent. of the original weight), although at times the animal has been kept in nitrogen equilibrium and weight equilibrium.

2. The *nitrogen* metabolism presents points of interest. The total nitrogen absorption being less than in control animals.

3. *Urea*. The urea output has not been altered by the operation. The daily amount has varied under the influence of acids and alkalies, and, in a general way, it may be said that the animal is less resistant to an acid intoxication than the control.

4. *Ammonia*. The neutralization of acid in a normal animal takes place by a hyper-production of ammonia, and Labbé finds that partial pancreatic removal interferes in no wise with this mechanism.

5. The process of desamidization which seems to be dependent on the liver, in a normal dog, has been greatly interfered with in the operated animal, so that the latter excretes five or six times as much amino nitrogen as the control.

6. Acetone bodies make their appearance indicating a moderate degree of acidosis which is much aggravated by a rapid decrease in the amount of nourishment given.

7. Glycosuria has been produced, the quantity of sugar being a certain ratio to the protein injected. Fasting seems to cause diminution in the glucose output.

8. Ammoniacal intoxication causes diminution of sugar. With glycosuria there is no polyphagia, polydipsia, or polyuria.

9. The feces examinations show faulty fat absorption.

10. Labbé believes that the deficient pancreatic secretion is compensated for by other supplementary functions about whose nature he is not clear. He thinks that the view of some, that acidosis is brought about by nitrogen derivatives of proteolysis, receives confirmation in the high amino acid figures which he found in his dogs.

Strangely enough, the experimental animal presents two kinds of intoxication: The acidosis caused by acetone bodies and the acidosis caused by amino acids.

¹ Rev. de Méd., April and May, 1912.

This article is one of the best which has appeared in recent years, and represents a great amount of work. Of course it would have been impossible to study all phases of the effects of a pancreatectomy, but the article teaches us how really futile it is to find a diagnostic sign of pancreatic insufficiency in the already urinary changes. It may be that a study of the amino nitrogen might be of aid, and one can but conjecture how small a disturbance of this must arise in disease of the pancreas. Six-sevenths of the pancreas being removed is accompanied by marked changes, it is true, but how large must the clinical lesion be in order to cause any disturbance in the amino acid output? Clinically, faulty fat metabolism is generally found, but with the uncertain help offered by the present functional tests, and with the knowledge that one-seventh of the pancreas is sufficient to maintain nitrogen balance, it behooves us to blaze new trails, as the older ones have led us back to the original starting place, which must be regarded as a barren desert as far as our knowledge of functional tests is concerned.

Effects of Ligation of the Pancreatic Ducts. According to Kirkbride,¹ ligation of the ducts is followed by no changes in the islands of Langerhans. Since ligation is not followed by glycosuria, and, since these islands persist, this would seem to offer very strong proof that the latter are especially, if not exclusively, concerned with the maintenance of the normal carbohydrate metabolism.

Pancreatic Cysts. Although the subject of cysts of the pancreas belongs more properly to the section of PROGRESSIVE MEDICINE devoted to surgery, it may not be amiss to direct the reader's attention to an article by Wolff² on cysts and pseudocysts of the pancreas. In this paper he reports 3 cases, and devotes considerable space to the diagnosis of the condition. Walker³ puts on record a case of ruptured pancreatic cyst with recovery. Le Moniet⁴ publishes a case where operation was successfully performed.

Echinococcus of Pancreas. Taking one case as a text, Hansen⁵ has reviewed all the literature on the subject, finding but 28 cases on record, some of which must be doubtfully regarded, so that but 15 cases remain as authentic. Diagnostically, it presents no features not observed in pancreatic cyst, and all agree that the condition cannot be diagnosticated before operation.

¹ Journal of Experimental Medicine, 1912, xv, p. 101.

² Beitr. z. klin. Chir., 1911, lxxiv, p. 487.

³ British Medical Journal, August 19, 1911, p. 360.

⁴ Archives Gén. de Chir., 1912, vi, p. 11.

⁵ Beitr. z. klin. Chir., 1912, lvii, p. 360.

DISEASES OF THE KIDNEYS

By JOHN ROSE BRADFORD, M.D.

Hemoglobinuria. Foise and Salin,¹ in dealing with the subject of hemoglobinuria, describe three varieties of the condition: (1) Toxic hemoglobinuria, (2) the hemoglobinuria of infective processes, and (3) paroxysmal or essential hemoglobinuria. Paroxysmal hemoglobinuria was recognized as a clinical entity by Dresler in 1854, and independently by Pavy in 1855; these authors described the main clinical features of the malady, and later writers, such as Mesnet, Lépine, and Murri, added to our knowledge, but dealt mainly with the various theories advanced to explain its remarkable features. Early in the study of the disease the importance of syphilis as an etiological factor was recognized, and Murri laid special stress on this point. In the last ten years the subject has been approached from the experimental side, more especially by Donath and Landsteiner, and also by Eason.

At the present time three main views are held as to the nature of the process: (1) That the primary source of the trouble is an alteration of the blood, either of the red corpuscles or of the plasma. (2) That the destruction of the red blood corpuscles takes place only in the kidney. (3) That the hemoglobinuria owes its origin, not to the blood hemoglobin, but to the hemoglobin of the muscles passing out into the blood stream, and being then excreted. The second and third of these views rest mainly on theoretical considerations, since muscular, not renal, lesions have been constantly observed in cases of paroxysmal hemoglobinuria in man. Hence at the present time the view that the malady is primarily a blood disease has by far the most adherents, and many experimental and clinical facts can be adduced in support of it. Thus Hayem long ago observed the ease with which the serum of these patients became laked, and Ehrlich demonstrated how the cooling of the hand in iced water (after the circulation had been temporarily arrested by a tight bandage around the arm) caused the blood obtained by puncture of a finger to be laked. Ehrlich's phenomenon is by no means constant in all cases, but his observation has been confirmed by many other observers.

Donath and Landsteiner made the very important observation, subsequently confirmed by Eason, that the plasma of patients suffering

¹ Archives de Médecine Expérimentale, May, 1912, Tome xxiv, No. 3.

from paroxysmal hemoglobinuria contained a hemolysin, that was capable not only of hemolyzing the corpuscles of the patient, but also the corpuscles of normal individuals. These observers further showed that cold favored the anchoring of the hemolysin to the red corpuscle, although the actual hemolysis did not take place until the mixture of serum and corpuscles was raised to the body temperature. Further, they found that the hemolysin was persistently present in the blood of the patients both during the attacks and in the intervals between attacks. Cold, the well-known cause of the attacks, acts, therefore, not by producing the hemolysin, but by favoring its union with the red corpuscles. In the light of their work, the theory that the disease was due to a hemolysin present in the plasma, and capable of hemolyzing even normal red corpuscles, seemed securely established, and hence this theory was widely accepted. It would seem, however, that neither the Ehrlich phenomenon nor that described by Donath and Landsteiner is constant, and hence a uniform explanation of all cases of paroxysmal hemoglobinuria is, perhaps, not tenable.

Foix and Salin have themselves made a series of observations in a case of paroxysmal hemoglobinuria where they were unable to demonstrate in the serum of the patient's blood any hemolysin, but where, on the other hand, the red corpuscles of the patient were very readily hemolyzed by normal human serum after exposure to cold. Hence these authors conclude that at least two different kinds of blood lesions may be present in paroxysmal hemoglobinuria; one type of case being associated with the presence of a hemolysin in the plasma, and another type being dependent upon some peculiar fragility of the red blood corpuscles. The case investigated in detail by the authors was a very typical one in a man who had suffered from syphilis, and was subject not only to attacks of paroxysmal hemoglobinuria, but also, as is not infrequently the case, to attacks of paroxysmal albuminuria without hemoglobinuria. The hemoglobinuria attacks were accompanied by slight jaundice, and the urine yielded a granular deposit and some casts, but no deposit of red corpuscles. The red corpuscles of this patient were readily hemolyzed, both before and after exposure to cold, by certain normal sera, whereas the serum of the patient never caused the hemolysis of normal red cells. The curious fact was noted that sometimes the patient's serum failed to hemolyze the patient's red corpuscles, and hence the authors think that the blood of cases of paroxysmal hemoglobinuria may possibly contain certain antihemolytic substances of a protective nature. These conclusions were confirmed by the examination of two other cases of paroxysmal hemoglobinuria, where also an undue fragility of the red corpuscles was detected, and where the phenomenon of Donath and Landsteiner was absent.

Some authors have attributed the absence of hemolysis in certain cases of paroxysmal hemoglobinuria to the absence of complement

and have inferred that the serum contained a hemolysin, notwithstanding the absence of hemolysis. Foise and Salin consider this explanation inadequate in the light of their experiments, inasmuch as they found that such a serum that was incapable of hemolysing the red corpuscles of man was hemolytic to the red cells of the rabbit. These authors deal also with the question of renal and splenic changes associated with paroxysmal hemoglobinuria. That the kidney is affected during the attack is seen from the fact that albuminuria alone may characterize an attack, and that even in typical hemoglobinuric attacks albuminuria precedes the hemoglobinuria. Further, the urine during the attacks contains casts. The spleen is apt to undergo enlargement during an attack, but this hypertrophy is probably secondary, and due to the primary blood destruction. The authors also dealt with the subject experimentally, and show that a condition very similar to that of paroxysmal hemoglobinuria can be produced experimentally in the rabbit by the injection of human serum into the vein of the ear. This procedure causes an albuminuria that is followed by hemoglobinuria of gradually increasing severity, and this is followed by a second period of albuminuria without hemoglobinuria. Human serum heated to 56° C. produced very similar effects, and has the advantage of being far less toxic and, hence, larger quantities can be used. The authors have studied in detail the blood changes produced by such injections, and they found that the experimental hemoglobinuria is accompanied by a very large destruction of red cells, varying in amount from one-fifth to even as much as three-fifths of the total number of red cells in the blood. Further, the red corpuscles become less resistant to a hypotonic serum, and it is even possible to demonstrate that they become more fragile and therefore more readily hemolyzed. These authors conclude that cold, the common factor in producing attacks in the human subject, acts by causing the hemolysis of red corpuscles unduly fragile in character, and prone to undergo hemolysis from many causes. It must be confessed that this conclusion is somewhat unsatisfactory, as it fails to explain the very specific action of cold in the disease. These patients suffer from hemoglobinuria after exposure to cold, but there is no clinical evidence that the hemoglobinuric attacks are brought on by other definite causes. The great merit of Donath and Landsteiner's work was that it did afford an explanation, but inasmuch as their phenomenon is not found in all cases, it manifestly cannot explain all, and it would certainly seem that Foise and Salin have demonstrated that in those cases in which the serum cannot be shown to contain a hemolysin, the red corpuscles are themselves unduly fragile.

Achard and Fenillié¹ deal with the subject of hemoglobinuria from

¹ Archives de Médecine Expérimentale, Tome xxiii, No. 5.

an experimental standpoint, and their conclusions are in many respects very different from those of Foise and Salin, inasmuch as they traverse the statement that hemoglobinuria is necessarily preceded by hemoglobinemia, and they consider that hemoglobinuria may often result from a renal or urinary lesion.

Achard and Fenillié emphasize the fact, noted by Camus and Paquiez, that hemoglobin has a low rate of diffusibility, and they state that it is necessary for the blood plasma to contain as much as 0.23 per cent. of hemoglobin before the kidney can excrete it and so cause hemoglobinuria. Camus and Paquiez considered that the hemoglobin of muscle was more diffusible than the hemoglobin of blood, and they were led by this to think that possibly paroxysmal hemoglobinuria in man was really of muscular origin, and so in some respects similar to the well-known affection in horses, where the hemoglobinuria has been correlated with muscular lesions. Achard and Fenillié have observed, in sections of the kidney in the hemoglobinuria produced experimentally, the presence of red corpuscles in the glomeruli and tubules, and they state that they have been able to follow the stages showing the dissolution of the red cells and their subsequent fusion to form casts in the renal tubules.

Further, the blood plasma in cases of experimental hemoglobinuria is said often to show no signs of laking, even when the hemoglobinuria was quite marked, and when it has been produced by the injection of laked blood. In another series of experiments, purified hemoglobin was injected instead of laked blood, although this produced a slight degree of hemoglobinemia, no hemoglobinuria resulted, and the authors draw the conclusion that the injection of blood causes hemoglobinuria more readily than the injection of the purified hemoglobin contained in the blood.

The injection into the blood stream of muscle hemoglobin readily causes hemoglobinuria, and this is the case even when the extract is prepared from the pale muscles of the rabbit so that the amount of hemoglobin contained in the extract is minimal. Further, an extract of white corpuscles also readily produced hemoglobinuria, notwithstanding the fact that no hemoglobin was present in the extract. The kidney, when examined after these various injections had been made, showed signs of congestion and the glomeruli contained a few red corpuscles, and in places distinct hemorrhagic effusions were present, containing more or less altered red corpuscles; the interstitial tissue also showed the presence of hemorrhages. The cells of the convoluted tubules were vacuolated and the nuclei presented changes. The tubules also contained granular casts with altered red corpuscles in their interior. The injection of methemoglobin and of C. O. hemoglobin also leads to the production of hemoglobinuria, but the pigment in the urine is stated by these authors to be in all cases hemoglobin and

not methemoglobin or C. O. hemoglobin, and therefore they conclude that it owes its origin to the hemoglobin of the animal's red corpuscles, and that it is not derived from the hemoglobin injected. The mechanism by which this supposed intrarenal hemolysis occurs is obscure, as neither a kidney extract prepared from a hemoglobinuric animal nor the urine itself can be shown to be hemolytic.

These authors conclude by emphasizing the point that paroxysmal hemoglobinuria cannot always be due to a simple hemoglobinemia, since this may be absent, and, further, that inasmuch as albuminuria is more constant in such cases than hemoglobinuria, a renal element must play an important part in the pathology of the disease. It is, however, surely possible that the albuminuria is really only an effect produced by the presence of toxic substances in the blood stream.

Nephritis of Syphilitic Origin. Mosny and Montier¹ record 3 cases of nephritis occurring during the course of secondary syphilis and causing death. They deal generally with this important variety of nephritis that so frequently escapes notice, or if the nephritis itself is recognized, its real nature and specific origin is overlooked. In 2 cases death supervened rapidly, in 1 case the nephritis was marked and severe within six months after the development of the chancre, and in a second case, in which death occurred five months after the initial chancre, the renal lesion ran its course in one month.

The authors quote a series of 25 cases observed by Fournier, in 11 cases of which the nephritis appeared two months after the initial chancre, in 2 cases three months after, in 3 cases four months after, in 3 cases five months after, in 1 case after six months, in 2 cases after eight or nine months, in 1 case after ten months, and in the last case of the series the nephritis occurred within a year after infection. In many cases in which nephritis ensued, the syphilitic symptoms were very severe, a high degree of toxemia being present, and sometimes the other and better known secondary symptoms were well marked. Thus extensive roseolous and papular eruptions were noted, and in some cases specific ulcers and mucous plaques were observed. In a considerable proportion of cases the initial chancre was extragenital, but the authors are doubtful whether any importance is to be attached to this fact.

The nephritis itself is generally marked by a sudden onset, with much anasarca and often considerable serous effusions, and the most characteristic feature of all, *i. e.*, the presence of a severe albuminuria. The minimum quantity of albumin present is usually over 20 grams per liter, and quantities as high as 110 grams per liter have been recorded. This high degree of albuminuria is very characteristic of certain forms of syphilitic nephritis, and it may occur not only in

¹ Archives de Médecine Expérimentale, Tome xxiii, No. 5.

association with dropsy and serous effusions, but also in cases in which dropsy is absent. The clinical cause of the malady is variable, but one of the most characteristic features is the remarkable manner in which improvement and recovery will sometimes take place in cases in which, from the severity of the anasarca and of the albuminuria, a most grave prognosis would seem to be justified. Many cases, however, end fatally, and have also, even when the fatal end is delayed, a most capricious, although lengthy, course.

The authors lay stress on the absence of high tension and of the well-known "bruit de galop" so common in many forms of nephritis. They draw attention to the fact that there are exceptions to the statement that large amounts of albumin are always present. Thus cases have been recorded with less than 10 grams of albumin per liter, and the gravity of the disease is by no means to be measured by the degree of albuminuria, since some of these cases with but little albumin have been fatal, whereas it is well known that many of the cases with marked and even massive albuminuria do well and may even recover completely.

The authors give the anatomical findings in these cases of syphilitic nephritis, together with the results recorded in literature, and they conclude that three types of nephritis exist in relation to secondary syphilis. The first is one in which epithelial lesions preponderate, and where practically the whole of the renal parenchyma is involved; in other words, a massive epithelial type. A second type is that in which mixed lesions are present with a variable degree of arteritis coexisting with the marked epithelial lesions. In the third type, the lesions are mainly interstitial. A further conclusion is that the cases of acute and severe nephritis usually occur early, and generally within six or seven months of the initial lesion.

The prognosis is most uncertain, but it would seem as if it were more grave if the onset of the nephritis is within a few months of the occurrence of the initial lesion, and if anasarca is marked and generalized from the onset. On the other hand, the degree of albuminuria is most misleading as a prognostic guide, as cases with 110 grams of albumin per liter have recovered.

Supernumerary Kidney is such a rare condition that the full record of a case observed in the dissecting room by W. M. Mills and described in the *Journal of Anatomy and Physiology*, vol. xlvi, third series, vol. viii, Part iii, April, 1912, is of interest owing to the fulness of the record available. The right kidney in this case was anatomically normal, and so were also the ureter and the right adrenal, but the kidney was small, weighing 42 grams and was cirrhotic. On the left side there was a mass about four times as large as that on the right side, and two ureters passed from it to the bladder and opened separately, so that there were in all three ureteral openings into the urinary bladder. The mass was divided about its middle by a transverse constricting groove, and the

lower segment was of the same size and shape as the right kidney. The upper segment, which was, as the author states, a distinct structural entity, and, therefore, a supernumerary kidney, was attached to the superior and internal aspect of the lower segment. In shape, it was round, and its volume three times that of the lower segment; the surface was smooth, and the capsule non-adherent, a distinct fibrous layer separated the kidney tissue of the upper segment from that of the lower. The author considers that from a functional point of view, the supernumerary kidney had been of more service than the other two organs. There was but one renal artery on the left side, giving its largest branches to the upper segment, and only a single renal vein was present. No adrenal body was found on the left side.

The author draws attention to the fact that the formation of a supernumerary kidney depends on the reduplication of the renal outbud from the caudal end of the Wolffian duct and, hence, in most cases some degree of double ureter is present. In very rare cases there may be separation of the renal blastema at the extremity of the two ureteral ducts, so producing the condition found in the author's case. The value of this case rests in the fact that it was carefully dissected, so many of the cases of supernumerary kidney hitherto described have been observed during operations, when it was not possible to completely elucidate the actual condition present. In some instances the supernumerary organ has been found in close association with one or other kidney, in others at a distance, for instance, just above the pelvic brim some three or four inches below the normal kidney. The blood supply also varies. Instances have been recorded in which the supernumerary organ received a separate and distinct blood supply and others were as in this case described by Mills, there was but one renal artery on the side of the supernumerary organ. In some cases the additional organ was found diseased and in one remarkable case recorded by Tschundy and mentioned by Mills, there was not only a complete double formation of one kidney, but the upper portion was distended and septic, while the lower was normal.

Functional Activity of the Kidneys. Cathelin¹ deals with the methods available at the present time for determining the functional activity of the kidneys and more especially for ascertaining the relative efficiency of one or other kidney with certainty. He discusses the relative advantages of catheterization of the ureters and of separation of the urines in the bladder by the use of some kind of segregator.

Catheterization of the ureters is often impossible owing to the nature of the lesions present, and for segregation the author prefers either Downe's apparatus or his own. He thinks that, in about 50 per cent. of the cases that come under the surgeon, catheterization of the ureters

¹ *Folia Urologica*, Band vi, No. 2.

is possible, and that in about 40 per cent. of cases some method of segregation is applicable. In the remaining cases either such exploration is not required, or else it is impossible of achievement. In not a few cases separation of the urines in the bladder has succeeded when catheterization of the ureters has failed to yield satisfactory results. It is obvious that in any method for determining the functional activity of the kidneys it is essential to have reliable means for separating the urines of the two kidneys.

Cathelin discusses fully the various methods of analysis of the urine that have been employed and criticises their defects. Thus *cryoscopic methods* have not yielded, on more extensive use, the satisfactory results at first expected. Thus urines with a satisfactory freezing point have often been obtained in which subsequent exploration showed the presence of advanced tuberculosis of the kidney or hydronephrosis, and in which consequently but little healthy renal substance was present. Again, the use of the *methylene blue test* is often misleading, as this pigment may be excreted freely by kidneys previously diseased. The author quotes a case in which a patient with a large tuberculous right kidney excreted methylene blue freely, and yet, as the sequel of operation showed, this extensively diseased kidney was the only kidney present. The methylene blue method, however, is of value when used after the urines from the two kidneys have been adequately separated.

Cathelin considers that the results obtainable from a study of the *urea excretion* are those of the greatest value, and also the least misleading, and that the urea excretion is really the best measure of the efficiency of the urinary filter. He considers that variations in the urea excretion are less likely to depend upon diet than is the case with variations in the chloride excretion, as this undergoes great fluctuations consequent on the different amounts of sodium chloride present in the diet under different conditions. The specific gravity of the urine and the quantity of chlorides present are also factors of considerable importance, but urea determinations can be made with far smaller quantities of urine than those required for gravity and chloride estimations, and this is a great advantage when conclusions have to be drawn from the examination of the samples of urine obtained by catheterization of the ureters, as such samples are often small. He emphasizes the fact that the actual quantity of urea excreted varies necessarily within wide limits, and he states that he has seen a case with but one kidney where the daily excretion did not exceed 2 grams. On the other hand, some patients may excrete as much as 50 grams per diem. These are, however, extreme figures, and usually some 20 grams of urea per diem may be looked upon as a good amount, 15 grams as passable, and that operative interference is possible if the daily output of urea is above 10 grams. A less excretion than 10 grams per diem is of evil augury, and a contraindication to any operative

interference. He considers that the percentage amount of urea per liter is a factor of the first importance, without any qualification as to the amount of urine passed during the period of examination. This conclusion applies, it is to be understood, to the analysis of the urine collected, as a result of simultaneous catheterization of the two ureters, and it is merely the method recommended for comparing the functional activity of the two kidneys. It is, of course, well known that in certain conditions, a dilute urine with a low percentage of urea may be passed with a satisfactory state of general health and without necessarily the presence of any serious renal disease. The percentage of urea in these separated or segregated urines is an exact measure of the functional activity of the renal parenchyma, and a measure, therefore, of the degree of destruction present. The author records instances where the difference in the percentage of urea in the urine separated from the two kidneys remains constant over long periods, *e. g.*, several weeks. Thus, in one case recorded, the right kidney secreted a urine with 4.3 per cent. of urea, and the left kidney one with 14.3 per cent. A month later a similar exploration yielded urines containing 4.55 per cent. of urea from the right kidney and 14.3 per cent. from the left kidney. The elimination of chlorides, on the other hand, is a measure of the functional activity of the glomeruli. It is, however, largely influenced by diet and bears no constant relation to the urea excretion.

In trivial disorders, *e. g.*, movable kidney, the secretion obtained from the two kidneys may be practically identical as regards the percentage of urea, although there may be some difference in the amounts of urine secreted. Cathelin also emphasizes the importance of the color of the urine, and the fact that a normal or high color is an indication of sound renal substance. In renal tuberculosis the quantity of urea excreted is not very profoundly affected until the malady is advanced. The author considers that if the diseased kidney is secreting a urine with a percentage of urea about half that obtained from the urine of the sound kidney, probably about half the kidney is destroyed, and that if the diseased kidney yields a urine containing only very small quantities of urea as compared with the sound kidney, that it is probably of no functional value, and is merely a sac. The author concludes by stating that he has relied on this method during the last ten years in deciding on the desirability of performing nephrectomy, and that in some 200 cases he has had no cause to regret the reliance he has placed especially on the information afforded by the estimation of the percentage of urea.

Movable Kidney. Cathelin¹ seeks to explain the prevalence of movable kidney in the female in a novel manner. It is well known that this condition is much more common in women than in men, and further,

¹ Folia Urologica, Band vi, No. 10.

that the right kidney is much more frequently unduly mobile than the left. As Cathelin points out, the displacement can scarcely be due to the effect produced by the size of the liver, since this would apply equally to man, nor can the use of the corset be held to be solely responsible, since the mobility may be of congenital origin, and at any rate be marked in the young prior to the wearing of corsets.

This author thinks that there are three main factors in producing at any rate some varieties of movable kidney: (1) The size of the liver; (2) the shape of the female pelvis, and (3) most important of all, the peculiar curled-up position that is necessarily assumed by the human fetus *in utero*. This constrained position tends to force the viscera downward, and the relative large size of the fetal liver presses upon and pushes down the right kidney. The two conditions are equally common and efficient in the two sexes, but whereas the canal of the pelvis in man is represented by a cylinder with more or less equal apertures at its upper and lower extremities, in the female the canal of the pelvis is funnel-shaped with the larger aperture upward, and thus the descent of the kidney is facilitated in the one sex and not in the other. The constrained and cramped position of the fetus is in large part due to the large size of the fetal head and the situation of the kidney is such as to make it very susceptible to pressure from the liver. Although Cathelin regards this explanation as sufficient to explain renal mobility and displacement, he insists on the point that it would only explain some cases, *i. e.*, those of congenital origin and that other varieties of movable kidney exist, such as the traumatic and also the acquired form. Doubtless for some of the latter the usual explanation that attributes the condition to laxity of the abdominal walls and to pressure effects is adequate.

Albuminuria. Banninger¹ deals, in an interesting and important paper, with the *prognosis of the albuminuria observed so frequently in the apparently healthy* when presenting themselves for life assurance. He had the opportunity of examining the records of 396 men, who, on presenting themselves for life assurance in the years 1900 and 1901, were found to be suffering from albuminuria with or without casts, but with no other physical signs of disease, and in half the cases the albuminuria was found to be present at least on two occasions. The casts were examined for after the centrifugalization of 15 c.c. of urine.

These 396 cases of albuminuria could be divided into three groups: (1) One of 115 men, where albuminuria only was present, and no casts of any kind were found; (2) a group of 203 cases, where hyaline casts were also present; and (3) a group of 53 cases, where the albuminuria was associated with the presence of granular casts.

The analysis of the *age incidence* yielded some interesting results.

¹ Archives of Internal Medicine, vol. ix, No. 6.

Thus, the cases with albuminuria alone were five times more frequent before the twentieth year than after. Albuminuria with hyaline casts had approximately the same incidence in the second, third, fourth, and fifth decades, and finally, the cases with albuminuria and granular casts showed an increasing incidence in each decade, so that in the fourth and fifth decades they were four times as frequent as in the second and third. As Banninger points out, the unexpected result was the almost equal incidence in the second to the fifth decade in the second group of cases, where the albuminuria was accompanied with hyaline casts. Ten years after the initial examination, *i. e.*, in 1911, 70 out of the original 396 men were again examined. Twenty cases were examined in whom ten years previously albumin, but no casts, had been found. Twelve of these men were apparently normal, presenting no signs of cardiac or of renal disease, and albumin was absent from the urine. In 8 cases albumin was still present, and in 4 of them casts were also found. In no case among the 20 examined were the signs or symptoms of interstitial nephritis present. As regards the second group of 203 men in whom albumin and tube casts had been present ten years ago, 30 of these 203 cases were examined. One presented definite signs of interstitial nephritis, and 2 others were regarded as doubtful. Eighteen were found normal as regards the state of the heart, vessels, and urine, and 9 showed the same state of the urine as that existing ten years previously. As regards the third group of 53 cases in which albumin and granular casts had been found ten years before, 20 cases were examined, and 8 of these were apparently normal so far as the heart or kidneys were concerned, 2 are suffering from interstitial nephritis, and in 5 others this malady may be present. Thus in the entire series of 70 men examined 38 were, ten years after the first examination, apparently free from cardiac or renal disease, 3 had definite interstitial nephritis, and possibly 7 others were also suffering from it, 2 had diabetes, and 22 presented the same urinary changes that they did at the previous examination ten years before.

Among the original group of 396 men, 25 deaths had occurred in the course of the ten years, and, as Banninger points out, this mortality is high, inasmuch as the expected mortality in ten years for the 396 men would have been 16 instead of 25. This excessive mortality agrees with the experience of insurance companies, and Banninger quotes some statistics from insurance experience, from which it would appear that if the mortality for sound lives per 10,000 be represented by 100, that of a similar group of lives where albumin and hyaline casts were present would be 137, and for a group where albumin and granular casts were present it would be 220. Thus the mortality is lowest among men showing albumin only, but it is notably greater even in these than in perfectly healthy subjects. One of the most striking facts elicited from the study of the deaths was that whereas there were 3 deaths

from nephritis, there were 8 from pulmonary tuberculosis. The mortality from nephritis was high, but all the deaths occurred in the group of cases where granular casts had been present. The absence of any case of nephritis in the series of 20 cases of albuminuria after the lapse of ten years shows that it is at any rate exceptional for the albuminuria of young adults to be a sign of early nephritis, but the high mortality from tuberculosis would tend to suggest, in the opinion of Barringer, that the presence of albumin in young adults is a sign of lowered resistance and possibly even of an increased susceptibility to tuberculous infection.

Anasarca in Renal Disease. Widal, B nard, and Vaucher¹ deal with a novel method of estimating the degree of anasarca present in renal disease, and the effects of diet and treatment in its relief. The variations in the amount of water in the blood plasma are more or less parallel to the varying degrees of hydremia of the tissues, and hence any method that enables a determination of the water content to be made will afford valuable means of observing the effects of treatment, etc., on renal dropsy. The most accurate method of determining the degree of concentration or of dilution of the blood is doubtless that of determining by weight the amount of albuminous substances present in a given volume of blood, but this method, for obvious reasons, is not suited to clinical purposes, and hence Widal and his collaborators used the refractometer. The use of this is based on the principle that a ray of light undergoes refraction in passing through serum, and the amount of this refraction depends upon the albumin concentration, hence the refractometer can be used to ascertain the amount of albumin present in any given sample of serum, and inasmuch as the quantities of serum required are very small, the method is well adapted for clinical purposes. When this method is tested by the control of weighing the total proteids in the serum, Widal states that it is found to be very accurate, the error not being greater than 0.6 per cent. for a normal serum.

According to these authors, in normal individuals the quantity of albumin varies between 76 and 84 grams per liter. In the dropsy accompanying tubal nephritis the refractometer shows that the blood plasma may become very dilute, the percentage of albumin falling considerably. Thus in 1 case recorded by the authors, there were but 48 grams of albumin per liter in the case of a young patient with an epithelial nephritis. On the other hand, in the dropsy of cardiac disease, and in that of interstitial nephritis, the percentage of proteid in the serum is much higher and nearer to the amounts found in normal individuals. This method then enables determinations of the degree of hydremia present in dropsical patients to be made, and the records of

¹ Suppl ment and Annales des maladies des organes g nito-urinaires, Juillet, 1911.

the body weight will yield information as to the degree of tissue infiltration present. When these two methods are used together, it can be seen that tissue edema is always accompanied by edema of the blood or hydremia. When dropsy is subsiding, this is first seen by a fall in body weight, and it is only later that the refractometer shows that the blood has also become concentrated. According to these authors, the refractometer shows that the dehydration takes place in two stages, first the excess of water is eliminated, but the blood serum still remains dilute, then the dehydration continuing, the blood becomes more concentrated.

In the case of the so-called diuretic action of digitalis in cases of cardiac dropsy, interesting results are seen with the use of the refractometer. The increased vigor of the circulation caused by the digitalis actually causes the fluid to flow from the tissues to the blood, so that the giving of digitalis is followed by the development of a transitory hydremia, and this dilution of the blood may apparently take place very suddenly, the increased elimination of water, however, goes on and thus the blood is again soon concentrated. Somewhat similar results are also sometimes seen in renal cases with the action of such diuretics as theobromine. In cases of dropsy treated by withholding chlorides, very valuable indications may be obtained from the use of the refractometer. Thus in such cases, if, after the subsidence of the edema, the body weight undergoes an increase, but the refractometer shows a diminution of the blood proteids, this indicates that dropsy is returning. On the other hand, an increase in body weight with no fall in the refractometer curve indicates that a real cure is taking place, and that a return to a normal diet is possible. Thus it would seem as if the use of this method and instrument might be of value in the prognosis and treatment of cases of renal dropsy.

Pyelonephritis dependent upon the *Bacillus coli* is now well recognized as a common malady seen under a number of conditions, but more especially common in gravid women. These cases present very varying clinical pictures, sometimes that of a septicemia, and sometimes that of an obviously local renal affection. Much difference of opinion has existed as to whether the infection in these cases was an ascending one or a descending one, and many arguments have been adduced in favor of the view that the former was the more usual mode of infection. Still the theory of descending infections has always had its supporters, and 2 cases in support of this view are recorded by Widal and Bénard.¹

The first case in a woman, aged twenty-six years, and six months pregnant, presented marked symptoms of general septicemic condition together with pain, and an ill-defined swelling in the right lumbar region. The urine was scanty, turbid, not albuminous, and contained

¹ Journal d'Urologie, Tome i, No. 3, March, 1912.

a few leukocytes and abundant bacilli of the coli type. After a prolonged febrile illness, the patient recovered without any renal suppuration. Examination of the blood during the height of the illness yielded a pure culture of a bacillus similar to that obtained from the urine, and evidently of the bacillus coli type.

In the second case, the patient, a woman aged twenty-three years, and two and one-half months pregnant, presented similar symptoms, but the illness was less severe and of shorter duration. Here also the *Bacillus coli* was recovered not only from the urine but also from the blood. It is of interest that the serum of these patients, while agglutinating their own *Bacillus coli*, were yet unable to effect this in the case of the bacilli of the other patient. Some authors hold the view that in cases of suppurative pyelonephritis there is always a preceding stage of a general infection, and that a slight nephritis with bacilluria always precedes the stage of suppuration.

These cases emphasize the necessity of examining the blood in cases of pyelonephritis, and they certainly materially strengthen the case of those who regard the disease as usually the result of a descending infection.

Cystic Disease of the Kidneys. Agata,¹ in recording the results of an examination of a case of cystic disease of the kidneys summarizes the views at present held as to the nature of this condition. Three principal theories have been advanced to explain the cystic kidney: the inflammatory, the neoplastic, and the congenital anomaly of development theory, but inasmuch as cystic kidneys are met with congenitally in children and in adults, it is possible that the different varieties may have different causations, and that a single explanation is not applicable to all.

The principal arguments in favor of the inflammatory theory are the presence of foci of small-celled infiltration, the cicatricial character of the connective tissue, and the presence of atresia of the papillæ. On the other hand, it has been alleged that the foci of small cells are masses of fetal germinal cells and that they exist normally in the kidneys of the embryo, and further, that the connective tissue overgrowth is a tissue reaction produced by the cysts. Various authors have tried to reproduce the cystic kidney experimentally by cauterizing the papillæ, but such injuries have not been followed by the production of bone cysts. One author is stated to have produced cysts by this method in the rabbit provided the second kidney was removed either before or after the cauterization.

A great many authors regard the cystic kidney as a variety of new-growth of the nature of an adenocystoma. The abundant epithelial proliferation is, perhaps, the main argument used by the supporters

¹ Archives de Médecine Expérimentale, Tome xxiii, No. 6.

of this view, but opponents regard this proliferation merely as an attempt at regeneration. The congenital theory which would attribute the cystic kidney to a vice of development has also many supporters, and some of these regard the cause as a congenital obstruction of some kind to the uriniferous tubules, others think it is more complex, and due to an anomaly in, or absence of, the primitive renal buds.

The main arguments in support of the congenital nature of the condition are the facts that cystic kidney may exist in the fetus, and the newborn, and be associated not only with the formation of cysts elsewhere, but also with other congenital malformations and more especially with those involving organs developed from adjacent embryonic structures, and finally the resemblance of the cystic kidney to the fetal kidney. Some authors have tried to reconcile the differences by suggesting that the condition is essentially a neoplastic one engrafted on a vice of development.

Agata's own case occurred in a woman, aged forty-five years, who only presented symptoms for a relatively short time before her death from uremia. He gives a very full account of the histology of the cystic kidneys and lays special stress on the great proliferation of the epithelium. In many places this had an appearance suggesting buds, and in other parts there was actual duplication of the epithelial layer. In some parts of the cystic kidney Agata found smooth muscular fibers which in places were mixed with fibrous tissue so simulating a fibromyoma. Smooth muscle fibers have been detected by others in cystic kidneys, and it is easy, on embryological grounds, to understand how plain muscular tissue might be found in such a position. Muscular tissue has also been found in the normal kidney in the vicinity of the papillæ, and also by some observers on the surface of the human kidney, but no muscular tissue has ever been described in normal kidneys in the substance of the organ and in the midst of the tubules. For these reasons Agata considers that an inflammatory origin is not possible in his case, and that the cystic kidney must either result from a congenital anomaly or else that it is of neoplastic origin. He considers that the presence of smooth muscle fiber, the existence of cysts with papilliferous epithelium, and the characters of the connective tissue support the view that the cystic kidneys of adults are of the nature of a neoplasm possibly engrafted on a congenital malformation.

Renal Tuberculosis is by no means rare in childhood, and Vignard and Thévenet¹ draw attention to the statistics of various authors, such as Oscar Müller, who considered that among 100 tuberculous children, 33 would have renal tuberculosis. Dickinson is also quoted and he found that among 300 children with tuberculosis, the kidney was involved in 49 cases, whereas in 300 tuberculous adults the kidney

¹ *Journal d'Urologie*, Tome i, No. 3.

was only involved 17 times. Although the kidney seems to be more frequently involved in tuberculous children than in tuberculous adults, yet it is by no means the organ most often affected in children; the spleen, the liver, and the meninges are far more frequently involved than the kidneys. Vignard and Thévenet divide somewhat artificially the lesions present in the kidneys of the young into the medical tuberculous affections, and the surgical tuberculous affections, the former being by far the more frequent. Thus it is common to find an albuminuria or a hematuria in a case of more or less generalized tuberculosis or even in cases of visceral tuberculosis, and these cases usually present no marked renal symptoms, although a renal miliary tuberculosis or a tuberculous nephritis may be present.

In the latter affection the kidney is pale, greasy looking, and presents no tubercles upon examination. Vignard and Thévenet consider mainly the surgical form of the disease, and base their conclusions on the observations of some 47 cases of tuberculous kidney in children. The cases recorded in literature show that although the disease may occur even during the first few months of life, thus one case is mentioned, aged three months, and another at seven months, yet it is most common after ten years of age. In 38 cases where the age is mentioned, 4 occurred before two and one-half years of age, 8 between three years and five and one-half years, 9 between six years and ten and one-half years, and 17 cases between eleven and sixteen years of age. Twenty-one boys and 15 girls were affected, and the right kidney was involved 16 times, and the left 13 times.

The most interesting and important question, however, is whether the renal lesion is primary or secondary. The authors note that usually the child has been born of healthy parents and no history is obtained of any previous tuberculous infection. In only 5 cases was there any history of a previous tuberculous infection, and usually the malady developed at a time when the child is apparently in good health and there is no obvious cause to account for the renal involvement. The authors accept the view now generally held that the infection is primarily renal, and that it reaches the kidney through the blood stream, and that the early vesical symptoms are due not to a primary vesical lesion, but to the development of a cystitis often tuberculous, and set up as a sequel of the renal lesion.

The renal lesion is often unilateral, and it is estimated that the proportion of unilateral to bilateral cases is as two to one. The lesion is usually of the so-called cavernous type, and pyonephrosis is more common than pyelonephritis. The ureter is usually also involved, and its walls are greatly thickened, and thus it can be readily understood how easily the lumen of the ureter may become obliterated. In some instances this may lead to complete atrophy of the kidney, in others the kidney becomes connected into a fibrous sac containing caseous or

calcareous masses. In rare instances a massive tuberculosis converts the entire kidney into a large caseous mass. In very rare instances the entire urinary apparatus is involved, both kidneys, both ureters, and the bladder being all alike extensively involved, and in males the prostate and vesicular seminales may be affected even in quite young children. The portions of the kidney not directly affected may undergo some hypertrophy, and patches of fibrous overgrowth or even a definite sclerosis is not uncommon. Further, a fibrous perinephritis is common, leading to the formation of dense adhesions that may cause considerable difficulty in the course of operations. In some instances a great overgrowth of the fatty bed surrounding the kidney takes place, and in others a perinephritic cold abscess may develop.

The symptoms are apt to present a good deal of variety. Thus, hematuria is regarded as a common early symptom, and generally there is not only an increase in the amount of urine voided, but a most marked frequency of and urgency in micturition, so that not infrequently the child is thought to be suffering from true incontinence. Later on, the urine becomes turbid and the symptoms of a tuberculous cystitis, together with lumbar pain, are present. The symptom of incontinence and especially of nocturnal incontinence is extremely important, as it may not only be the earliest sign to attract attention, but the authors record a case where it was present for some two years, but its dependence on tuberculous kidney was recognized owing to the development of other signs. In a considerable proportion of cases the patients come under observation for cystitis, and may simulate calculous disease, and this may be so when the renal lesion is already far advanced, and yet has not caused any very definite renal symptoms.

These authors believe that, in exceptional instances, cases of renal tuberculosis may undergo spontaneous cure, but this is so uncommon that this possibility should not materially influence our views as to the most suitable treatment required. Medical treatment on the usual lines does not, in the author's opinion, offer a better prospect of cure than it does in the adult, although doubtless both in children and in adults such cures are occasionally seen. They consider that an early nephrectomy is strongly indicated in these cases, and that it offers the best prospect of success, although they suggest that prior to nephrectomy, the early cases should be given a course of medical treatment on the usual lines, provided that the child is kept under skilled observation so that a decision can be arrived at as to whether any real improvement is taking place or not. In all nephrectomies it is essential to remove as much as is possible of the ureter owing to the frequency with which it is affected. The presence of a perinephritic abscess increases greatly the gravity of the case, as the mortality after nephrectomy in those cases is notably higher than in those where this complication is absent.

Constantinesco¹ deals especially with the subject of INCONTINENCE OF URINE AS A SYMPTOM OF TUBERCULOUS KIDNEY, and records one case in which the patient gave a history that this was his only symptom at the onset of the trouble, and where it lasted for nearly three months, being then followed by increased frequency of micturition and other symptoms. The author, in analyzing 52 cases of renal tuberculosis, found 6 cases where nocturnal incontinence was marked, and in two of these it was the only symptom and the one that led the patient to seek medical advice. In addition to these 6 cases, the author has been able to find records of 6 others, making 12 in all—6 men and 6 women, whose ages varied between fifteen and thirty-eight years. In 4 of these 12 cases, the incontinence was the initial symptom, and in two cases this symptom appeared after nephrectomy and probably indicated the time at which the second and remaining kidney became affected. The author does not regard the incontinence as dependent upon a vesical lesion, since it commonly appears in patients who are well, and it often disappears after nephrectomy. Further, in 3 of these cases the author was able to determine with the cystoscope that the bladder was normal. This incontinence is seen both in children and in adults, and in cases in which the bladder is large as well as in those where it is small, and in cases in which the renal lesion is unilateral, as well as in those where it is bilateral. In 5 of the author's cases the renal lesion was probably bilateral. He regards the incontinence as being a true reflex incontinence somewhat analogous to the well-known frequency of micturition, diurnal and nocturnal, that is so characteristic of renal tuberculosis, and Constantinesco thinks that the reflex is of renal origin. Finally, he thinks that the clinical group where it is the leading initial symptom is at least as common as the well-known hemorrhagic type and it is possibly more common than this.

Rafin² has analyzed the initial SYMPTOMS THAT CAUSED THE PATIENT TO SEEK ADVICE in 160 cases in which nephrectomy had been performed for TUBERCULOUS DISEASE OF THE KIDNEY. Only operative cases were used, since then there could be no question as to the validity of the diagnosis, and also because cases in which the renal lesion was only part of a more or less generalized tuberculosis were thus excluded. Vesical symptoms were complained of in 61 per cent. of the cases, and definite renal symptoms in 19.4 per cent. Hematuria in 5 per cent., turbid urine in 2.5 per cent., the presence of albumin in 1.8 per cent. Renal pain and hematuria were observed in one case, *i. e.*, 0.62 per cent. Vesical pain and hematuria in 1.8 per cent.; general symptoms, such as loss of strength, in 2.5 per cent.; and vague indefinite symptoms in 4.4 per cent. These results show the great frequency of vesical

¹ Journal d'Urologie, No. 5.

² Journal d'Urologie, Tome i, No. 6.

symptoms as an initial or signal symptom in this disease, and true renal symptoms, such as pain, sense of weight, discomfort in the loins, or actual attacks of renal colic, less often usher in the malady. Rafin thinks that renal symptoms are probably really more common, but that the patient does not attach importance to them, and does not attribute his failure in health to the vague discomfort experienced in the loins. Thus we must recognize that renal tuberculosis does not necessarily affect the health of the patient to any marked degree at first, and it is not infrequent for the most extensive renal lesions to be present with the maintenance of apparently quite good health.

Israel, in *Folia Urologica*, Band vi, No. 4, also deals with the subject of the ULTIMATE RESULTS OF NEPHRECTOMY IN RENAL TUBERCULOSIS, and his conclusions, although in some respects opposed to the results of some of the authors above alluded to, are yet of very great importance in that they are based on the study of some 1023 cases, including 170 of his own personal observations. Israel concludes that the mortality after nephrectomy in urinary tuberculosis is 25 per cent., and he classifies the deaths in two series, *i. e.*, an early mortality of 10 to 15 per cent. occurring within six months of the nephrectomy, and a late mortality of 12.9 per cent. occurring after the lapse of six months. He concludes, therefore, that some 75 per cent. of the patients will be saved by operation. The mortality is higher in men than in women, and the principal causes of the late mortality are pulmonary tuberculosis and involvement of the other kidney by tuberculosis. Pulmonary tuberculosis is the cause of death in some 45 per cent. of the fatal cases, and renal tuberculosis in 35.9 per cent., while miliary tuberculosis occurs in but 14 per cent. On the other hand, miliary tuberculosis is answerable for most of the early deaths, and he states that, in the majority of cases, this fatal complication is directly due to the operative interference. In a large proportion of the cases that are fatal from pulmonary tuberculosis, this complication is really present before the operation. In some cases death results from non-tuberculous affections of the remaining kidney, such as nephritis, calculous disease, hydronephrosis, and pyelonephritis, and, in some instances, the calculous disease would seem to be a sequel of the operation. At least half of the late deaths after operation occur before the completion of the second year from the operation, but where tuberculosis of the second kidney is present or has supervened, life has sometimes been prolonged for as long as nine years after nephrectomy.

Israel considers that when tuberculosis of the second kidney becomes manifest after operation, it is really usually present at the time of the operation, and that only in some 11 per cent. of cases does it arise afresh, and that after the lapse of six months from the operation, the percentage of cases in which this complication occurs is only 1.6 per cent. Hence nephrectomy in unilateral renal tuberculosis frequently

prevents the development of tuberculosis of the other kidney, and, in fact, Israel considers that infection of the second kidney is much more likely to result from the focus of disease in the first kidney than from the presence of tuberculous lesions in other parts of the body, *e. g.*, the lungs.

After nephrectomy in unilateral renal tuberculosis, the tubercle bacilli disappear from the urine in 75 per cent. of the cases, but this can only be ascertained by animal inoculation. In such cases the frequency of micturition becomes normal and the patients are free from pain. Bacilli may sometimes be found in the urine for long periods after operation, and when the patient presents no symptoms and the general health is good and in some cases even the urine may be free from albumin. In about 25 per cent. of cases the urine will not become normal in character after operation, but will contain albumin, casts of the hyaline variety, and a few red blood corpuscles. As regards the cases in which the bladder is affected as well as the kidney, Israel states that the bladder condition undergoes cure in 43.5 per cent. of cases, and that some improvement supervenes in 45 per cent. Pain on micturition disappears more readily than frequency of micturition. Similarly, tuberculosis of the ureter will, in the majority of cases, undergo cure after nephrectomy, but in some 11.5 per cent. fistulæ in connection with the ureter may develop. Israel concludes by insisting on the extreme importance of early operation in unilateral renal tuberculosis, and that marriage should not be sanctioned until all bacilli have disappeared from the urine. He does not think that the spontaneous cure of renal tuberculosis ever occurs, or that, if it does, it is so rare as not to materially affect the opinion that should be given as to the necessity of immediate operation in suitable cases. Further, he does not believe that tuberculin is an efficient remedy, and that, therefore, it is inadvisable to postpone operative interference and to lose time in treating cases medically with or without tuberculin.

GENITO-URINARY DISEASES

By CHARLES W. BONNEY, M.D.

THE KIDNEYS, URETERS, AND BLADDER

The Surgical Treatment of Nephritis. The late George M. Edebohls enunciated the principle that all forms of nephritis might be benefited by decapsulating the kidney, inasmuch as he believed that many new vascular channels would be formed as a result of this procedure and that the resulting increase in the circulation of the organ would restore the vitality of the diseased epithelium. Although further studies have shown that the adhesions formed between the kidney itself and the renal pouch pocket do not become vascularized in the manner that Edebohls believed they would, and that consequently his theory could not be applied to all forms of nephritis, some urologists and surgeons still believe that there are certain forms of the disease in which decapsulation is productive of benefit, and for this reason they maintain that it should not be entirely abandoned as some have contended that it should be. Two contributions to this subject have been recently made by foreign surgeons—namely, by Cholzoff,¹ of St. Petersburg, and Lehmann,² of Breslau. The former considers the operation applicable to hemorrhagic nephritis and to nephritis complicated by uremia, anuria, or a severe grade of oliguria. In addition to these indications, the latter cites a number of cases of chronic interstitial nephritis in which the patients seemed to be temporarily benefited by the procedure and in which internal treatment seemed to have a better effect than it previously had produced. He also considers decapsulation helpful in certain suppurative renal conditions in which nephrostomy is contraindicated, using the former as an adjunct to drainage of the pelvis. He thinks it relieves pressure upon the kidney substance itself and thus temporarily increases the circulation, renders diuresis more active, and furthers the elimination of toxic products. In such cases he is under the impression that it has benefited several patients.

Another communication of interest in this connection is one by Samuel Lloyd,³ of New York, who reports 18 cases of nephritis in which decapsulation was performed, 6 of the number having been done by

¹ Zeitschrift f. Urologie, January, 1912, No. 1.

² Berliner klin. Wochenschrift, January, 1912, No. 4.

³ Southern Medical Journal, April, 1912.

Edebohls during the years 1906 to 1908, and the remainder by Lloyd himself. As a result of his experience, Lloyd maintains that renal decapsulation should be done in all cases of chronic nephritis except those in which the patient's condition is such as to contraindicate any surgical interference. In the series of cases which he reports there were 8 in which cure was obtained, the term "cure" being applied in strict accordance with Edebohls' rule, to the effect that the urine must remain free from albumin and casts and the daily excretion of urea be approximately normal for at least six months after the disappearance of the albumin and casts, and also that the patient must be free from the symptoms from which he previously suffered. Of the remaining 10 cases, there were 5 in which improvement was obtained, 2 in which death occurred within two weeks after the operation, and 2 in which it occurred at later periods thereafter. In the remaining case the result could not be learned. Bilateral decapsulation was done in every case.

A study of the results obtained by renal decapsulation in eclampsia has recently been made by Poten,¹ whose figures show that there is a higher mortality in this condition in those cases in which decapsulation is practised than in those treated by other methods. The mortality, in 98 operations, was 38.8 per cent. Those patients who did not succumb did not recover any quicker than the patients in whom the operation was not done. The conclusion to be drawn from this study is that the operation is not indicated in eclampsia.

Kümmell,² of Hamburg, in discussing renal surgery before the German Surgical Society, took up the question of the surgical treatment of Bright's disease. He has operated in 26 cases; 2 patients died a few days after the operation; 1 two months afterward; 1 five months afterward, and 1 eighteen months afterward. All of the other patients were apparently more or less benefited by the operation, although albumin in varying quantity, as well as casts, remained in the urine of all except 1, whose urine at the end of a year was repeatedly found to be free from pathological elements. Kümmell believes that, even in the most dangerous cases of nephritis, the decapsulation operation can be done with comparative safety under local anesthesia, and thereby some hope of benefit extended to the patient, who otherwise could not be offered the chances of operative relief. Nephrotomy, however, he considers to be too serious a procedure in such cases. In nephralgia, nephrotomy has been found to give better results than decapsulation, and in acute suppurative nephritis the former operation is likewise preferred.

An interesting case was reported by Arthur D. Dunn,³ of Omaha.

¹ Zeitschrift f. Gyn. Urologie, 1912, Band iii, Heft 3.

² Folia Urologica, June, 1912.

³ Journal of the American Medical Association, February 17, 1912.

He performed a double decapsulation operation upon a man who had been suffering from anuria for one hundred and fourteen hours, with the result that a free secretion of urine began four hours after the operation. The patient made a good recovery and at the time that the case was reported his urine did not show any abnormal elements.

Rupture of the Kidney. Michelsson¹ has reported 30 cases of rupture of the kidney due to injury which have been treated in the Hospital at Riga during the last twenty years. These cases all occurred in men. In the majority of them, the injury was produced by a violent pressure exerted upon the lumbar region, or by a blow directly over this region. Hematoma was the most characteristic symptom in all cases, in some being very slight and of short duration, and in others being large and persistent. In 2 cases, it lasted for fourteen and fifteen days respectively. In cases of extensive rupture, a peri-renal effusion took place forming a palpable tumor which, in some cases, attained a considerable size. The most interesting point in connection with these 30 cases is that surgical intervention was not practised in a single one, and that the mortality following this expectant treatment was only 10 per cent. Furthermore, in 3 cases in which death took place the patients had all sustained serious injuries other than one to the kidney, so that death could not be attributed to their renal injury. In one case the patient had a compound fracture of the leg, fracture of the arm, multiple fracture of the ribs, and was profoundly shocked; in the second, there were multiple fractures of the ribs and also a rupture of the liver, while in the third one the patient who had multiple fractures of the ribs, and also of the forearm, died of pneumonia at the end of the sixth day. Michelsson believes that surgical intervention is usually not indicated except in cases of persistent anuria following rupture and in those in which peritoneal complications develop. The results obtained in the series of cases which he presents seem to justify his opinion, and should make one cautious about intervening unless well-marked indications are present.

Perirenal Hematoma. Renewed interest in the subject of perirenal hematoma, which was first described by Wunderlich in 1856, has been aroused by a number of recent contributions to the subject. About two years ago Coenen, of Breslau, reported a case and also reviewed the literature up to that time. During the last year four other contributions to the literature have appeared. One was made by Lawen,² of Leipsic, who reported 2 cases; one by Russell Fowler,³ of Brooklyn, who reported 1 case; one by Seidel,⁴ of Dresden, who reported 1 case of

¹ Archiv f. klin. Chir., November, 1911, vol. xevi, fasc. 3.

² Deutsche Zeitschrift f. Chirurgie, 1912, Band cxiii, fasc. 3-4; *ibid.*, 1912, Band cxiv, fasc. 3.

³ Annals of Surgery, December, 1911.

⁴ Folia Urologica, June, 1912.

his own and 2 from the practice of Schmorl, and finally 1 by Schlichting. Seidel was able to collect 15 cases which, together with the 3 he reported and the other 2 herein mentioned, brings the total number up to 20. The pathogenesis of this condition seems to be different in different cases, and it would seem practical to divide them into two classes—namely, those in which the bleeding takes place from the kidney itself, and those in which its origin is extrarenal. The former may result from inflammatory or suppurative disease of the kidney, hydronephrosis, tumors, tuberculosis, and sclerosis of the renal vessels. In the majority of the cases recorded, the kidney itself was the starting point of the hemorrhage, as was shown by the presence of a collection of blood beneath the capsule. Generally, however, it is impossible to find an injured vessel of any size in which bleeding has occurred, so it seems probable that there are multiple lesions of very small vessels. With regard to the extrarenal cases, the bleeding has been demonstrated to come from the quadratus lumborum and the psoas magnus muscles. In Coenen's case it took origin from the former, and in one of Lawen's from the latter. It is interesting to note that both cases occurred in hemophiliacs, a circumstance which is very significant. Personally, I believe that there is no connection between the renal and the extrarenal cases, and, moreover, that the treatment of the two classes is intrinsically different. Certainly no one would think of operating upon a hemophiliac if he knew of the idiosyncrasy.

The *symptomatology* is practically the same in all cases. The onset of the symptoms is sudden, the patient being seized with sharp pain in the loin and abdomen, which soon becomes associated with an elevation of temperature and the development of a painful mass in the lumbar region. The swelling may extend over to the iliac fossa. The tumor varies in size from time to time, not infrequently becoming larger during the paroxysm of pain and then receding again during the periods in which the pain is not present. Eventually, however, it maintains constant dimensions, the fixed size being as large as a cocoanut or even as big as a loaf of bread. Seidel called attention to a discoloration of the skin over the kidney in the lower part of the abdomen and the scrotum. Signs of peritoneal reaction are almost always present, and, if the urine be examined, those changes which are usually present in nephritis are found. The signs of internal hemorrhage, such as pallor, coldness of the extremities, and weakness of the pulse are present, and in some cases the patient loses consciousness as the result of loss of blood after the hemorrhage has continued for some time or possibly earlier because of the sharp pain with which some of the attacks are ushered in. Severe shock is a very constant symptom. It was present as an early symptom in the majority of the 8 cases reviewed by Russell Fowler. Some cases are more severe than others, probably because of the difference in the degree of hemorrhage. There can be no doubt

that in typical cases operation should be done at the earliest possible moment. Six patients not operated upon succumbed, whereas of 14 operated upon, 8 recovered. In some of the milder cases in which the patients survived without operation, absorption of the encapsulated blood-clot took place, and lymph was poured out into the sac, with the result that a hygroma was formed.

Nephrectomy for Cancer. This subject was considered by Rafin¹ at the last meeting of the French Urological Association. He has performed 20 nephrectomies for this condition, 18 of which were upon men and 2 upon women. The ages of the patients varied from twenty-nine to seventy-one years, the greatest number being between the ages of fifty and sixty years. The right and left sides were affected with equal frequency. There were 7 operative deaths out of the number, which gives an immediate mortality of 35 per cent. Of the 13 who survived, 5 had a recurrence, which took place at variable periods of time after the operation, up to two years and one-half in one case. Five of the remaining 8 have gone from four to eleven years without any recurrence, and these the author considers as cured. In the remaining 3 cases, the time which has elapsed since operation varies from one year to one year and three months. All of the operations except 1 were done through the lumbar route. The author does not attribute any diagnostic value to the presence of symptomatic varicocele, as he found it only 8 times in 18 cases.

Partial Nephrectomy. V. J. Fechine² has collected 92 cases in which partial nephrectomy was performed. Of this number, cure was obtained in 70. Of the remaining 22, there were 10 in which the result was fatal; 2 in which it was non-successful; 8 in which it was doubtful, and 2 in which it could not be learned. The following table shows the conditions under which the operation was done and the results obtained:

Hydatid cysts	14 cases, 12 cures, 2 deaths
Hydronephrosis	1 case, 1 cure
Pyonephrosis, non-calculous	15 cases, 14 cures, 1 death
Pyonephrosis, calculous . .	3 cases, 3 cures
Tuberculosis	15 cases, 1 death, 7 results doubtful
Traumatisms	5 cases, 4 cures, 1 secondary nephrectomy
Renal calculus	1 case, 1 cure
Cystic tumors	3 cases, 2 cures, 1 secondary nephrectomy
Large serous cysts . . .	3 cases, 3 cures
Tumors of the kidney . .	9 cases, 6 cures, 2 deaths; 1 doubtful result
Pararenal tumors . . .	4 cases, 4 cures
Renal fistula	1 case, 1 cure
Horse-shoe kidney . . .	18 cases, 12 cures, 4 deaths, 2 unknown results

Of course, the first prerequisite must be a distinct localization of the morbid process, which must not reach the hilum. It is necessary that

¹ Ann. des Mal. des Org. Gen.-Urin., November, 1911, No.1.

² Travaux de la Clinique du Prof. Oppel, 1911, vol. iii.

the part of the organ which is left be in good condition structurally and functionally, and it is also necessary that the ureter be permeable. Hemorrhage is controlled by making digital compression upon the renal vessels. The wound in the kidney is closed with interrupted sutures passing through the inner thickness of the parenchyma and the fibrous capsule.

Polycystic Kidney. Rovsing¹ reports 3 cases of polycystic kidney treated by multiple puncture of the cysts after the kidney had been delivered through a lumbar incision. The renal function was improved and albumin disappeared from the urine. The good results are attributed to relief from the pressure which the cysts made upon the substance of the kidney.

Gonorrheal Pyelitis. Two cases of this rare complication of gonorrhea have been reported during the year. One case, reported by Franco,² of Rome, occurred in a woman, aged twenty-six years, who had been ill for four years, but who made a good recovery after a nephro-ureterectomy. A culture of the urine obtained from the right ureter and renal pelvis gave a growth of gonococci, which at first was associated with another diplococcus, but later was obtained pure. The author thinks that the original infection may not have been Neisserian, but that the primary infecting microorganism may have prepared soil for the gonococcus. Furthermore, he was not able to decide whether the infection was originally ascending or descending. An examination of the kidney itself showed the presence of chronic parenchymatous and interstitial changes as well as those of pyelitis.

Louis C. Lehr,³ of Washington, reports a case in a man, aged twenty-seven years, who came under treatment for acute gonorrhea early in November, 1911. In the middle of January the patient was free from all subjective symptoms, and his prostate and seminal vesicles showed no signs of involvement. His urine, however, was full of pus which contained diplococci. His bladder was washed out with a strong solution of silver nitrate, which caused practically no discomfort and brought about no change in the urine. From this latter circumstance it was inferred that the pus took origin from some part of the genito-urinary tract other than the posterior urethra, prostate, or bladder. Consequently a cystoscopic examination was made, with the result that purulent urine was seen escaping from the left ureteral opening. A culture made of this urine obtained through the ureteral catheter showed a Gram-negative diplococcus, which was assumed to be the gonococcus.

At first an autogenous vaccine was given, and injections of argyrol into the pelvis of the kidney were made through the ureteral catheter.

¹ American Journal of Urology, March, 1912.

² Folia Urologica, February, 1912.

³ Journal of the American Medical Association, July 6, 1912.

This treatment was without effect, and consequently pelvic lavage with a solution of nitrate of silver varying from 1 to 5000 to 1 to 3000 was tried. A small ureteral catheter (No. 5) was used, and 200 c.c. of the solution injected and allowed to flow out. Owing to the small size of the catheter it flowed back easily, and, in order to let it escape through the bladder, one cock of the cystoscope was left open. Immediate improvement took place. After the fourth irrigation the left ureter was catheterized, and cultures of the urine proved negative. This case is very interesting because of its insidious onset and the absence of renal symptoms.

Lehr states that there are about 20 cases of gonorrheal pyelitis to be found in literature. Franco, however, who has made a very critical examination of the literature, was able to find only 13 cases which he considered absolutely authentic. If to this number his own and Lehr's be added, the number is brought up to 15. Three cases received notice in my last year's review.

Metastatic Renal and Perirenal Abscesses following Furunculosis. W. Zinn,¹ of Berlin, reports 4 cases of this kind, the first being that of a man, aged twenty-six years, who was found to be affected with both renal and perirenal abscesses four weeks after having developed a furuncle of the nose. The pus from these abscesses gave a pure culture of staphylococci. The patient died following nephrotomy. At autopsy, thrombosis of the iliac veins was found. The infection had evidently first produced a thrombophlebitis of the inferior vena cava, then thrombosis of the iliac and femoral veins. The second patient ran a course of fever and had vague general disturbances for some time, after which the pain began to localize itself in the region of the right kidney. A history of a previous crop of boils was elicited. The renal abscess was opened and drained and the patient made a slow recovery, although he suffered from a phlebitis of the left thigh. The case of the third patient was followed from its very beginning. He had at first a large boil on the neck, which progressed to healing without any unusual incident. At the end of a month he developed fever, which was accompanied by pains in the region of the left kidney. An incision revealed perirenal and renal suppuration. This patient made a good recovery. In the fourth case the trouble came on between three and four weeks after the patient had had a boil. After a period of latency of about a week, fever developed and signs of suppuration in the left lumbar region manifested themselves. A lumbar incision was made and the pus evacuated, after which the temperature went down and the patient recovered. A culture of staphylococci was obtained from the pus.

These cases are interesting and their recognition important. They may develop after a felon, a superficial abscess, or an infected wound.

¹ Die Therapie der Gegenwart, April, 1912.

It would seem that a septic embolus first produces a small abscess near the kidney, which, as it develops, may open into the renal pelvis itself, but which more frequently produces a diffuse suppuration in the fatty capsule. The presence of pus is characterized by lumbar pain, which is made worse by palpation, and usually there is a swelling present. An examination of the urine is generally negative. The fever precedes the development of local signs, sometimes antedating it for one or even two weeks. During this early stage differential diagnosis is difficult, careful examination of the lumbar region being the only means by which attention may be directed to the kidney. If an early diagnosis can be made, the prognosis is favorable provided that intervention be practised. The latter, of course, consists in a free opening of the abscess and the institution of drainage.

Aluminum Acetate in Colon Bacillus Infection of the Urinary Tract.

Although the use of a solution of aluminum acetate in various inflammatory and infectious conditions has been long in vogue in Germany, it has been comparatively little known in this country. Some interesting experimental and clinical studies of its value in colon bacillus infection of the urinary tract have recently been made by Irvin S. Koll,¹ of Chicago. His first contribution to the subject, which was made at the Chicago meeting of the American Urological Association, has recently been supplemented by another, giving the results of further observation both in his own practice and in that of some of his colleagues. As the colon bacillus grows equally well on alkaline and slightly acid media, it occurred to Koll to investigate its growth upon distinctly acid media. For these bacteriological experiments a solution of aluminum acetate was selected after it had been found that a suspension of the subacetate had no effect in destroying microorganisms. Beginning with the full strength solution (N. F.), the experiments were carried on with dilutions variously reduced down to 1 per cent. It was found that a 2 per cent. solution would destroy 5 c.c. of twenty-four hour bouillon or urine culture in fifty minutes. The same result took place with para-colon and typhoid bacilli. The staphylococcus was unaffected, even when full strength solution was used. Further experiments showed that a 1 per cent. dilution was strong enough to inhibit the growth of these different members of the colon group.

In order to determine the effects of the solution upon the healthy mucous membrane of the urinary tract, a series of animal experiments was conducted, as a result of which it was found that a 2 per cent. solution produced no noxious effects. These experiments were conducted upon rabbits, and are described in detail in the author's first communication.

¹ American Journal of Urology, November, 1911; Transactions of the American Urological Association, 1911; American Journal of Urology, June, 1912.

The use of the preparation was then begun upon his patients. At the time of his first communication the author had treated 27 cases, comprising unilateral pyelitis, cystitis, and urethritis. Culture methods were employed to determine the presence of the colon bacillus. There were 7 pyelitis cases in which lavage of the renal pelvis was carried out in the usual manner, first irrigating until the fluid returned clear, and then injecting 10 c.c. of the medicated solution and removing the ureteral catheters. These treatments were given at intervals of from two to five days, according to the reaction produced. The shortest period during which any patient was under treatment was two weeks; the longest three months. Treatment was not discontinued until a culture from the urine was sterile and until the leukocytes had completely or almost disappeared. Cessation of pain followed the second or third irrigation, and no untoward symptoms manifested themselves in any of the cases; in fact, only 1 patient was confined to the hospital, and he was conveyed there on account of difficulty in voiding after the use of the cystoscope.

Fully as interesting are the results obtained in the cystitis cases, of which there were 8. In these cases, the bladder was first washed out with sterile water or boric acid solution, and then, after the fluid came away clear, from 60 to 120 c.c. of the 2 per cent. solution were injected and left in the bladder. The irrigations were given from two to four times in the twenty-four hours, according to the severity of the inflammation and the length of time which the patient could retain the fluid. In the most severe cases, marked relief was obtained within thirty-six or forty-eight hours.

There were 12 cases of urethritis, all of which were treated by means of anterior and posterior instillations with the Guyon or Ultzman syringe every second day, and also by allowing the patient to inject a 1 or 2 per cent. solution twice daily, the injection being held fifteen or twenty minutes. In some cases, patches of chronic inflammation were present and were touched with a full strength solution (N. F.) applied through the endoscope. Astringents were used in some cases after the colon bacillus had disappeared from the discharge. A number of case histories are incorporated in the author's first paper.

In the second contribution, 8 additional cases, 5 of which were urethritis, 2 cystitis, and 1 pyelitis, are reported. It took an average of thirty-one days' treatment to obtain sterile urine. Favorable results were reported in the other 16 cases treated by various surgeons. They also comprised cases of pyelitis, cystitis, and urethritis.

Koll has been able to follow 16 of the 27 patients whose cases he reported in his first communication. There were 3 recurrences, 2 of cystitis and 1 of urethritis, although in the last there was a possibility of a fresh infection.

Some of the surgeons who used this solution stated that it had

produced a great deal of vesical irritation. On this account the author, who had such unpleasant symptoms in only 2 of his own cases, suggests that in a very acute cystitis a 1 per cent. solution be used and that any resulting irritation be controlled with opium suppositories. He also insists that the solution be prepared in strict accordance with the directions given in the National Formulary, and that the dilution be prepared each time from the stronger preparation. If chemical changes result in the liberation of free acetic acid, then of course irritation is to be expected.

Colon Bacillus Infection of the Bladder and Renal Pelvis in Newly Married Women. Wildbolz,¹ of Berne, calls attention to a form of cystitis, sometimes followed by pyelitis, which occurs in newly married women independent of gonorrheal infection, and which he has found by examining the urine to be due to the colon bacillus. He believes that the infection takes place through lacerations of the hymen, and quotes Rovsing to the effect that in 3 cases of colon bacillus pyelitis the infection was traced through this portal of entry. To this condition he has applied the term "defloration pyelitis." In addition to the cases occurring in young women, he has observed one in an old woman affected with kraurosis vulvæ and senile contraction of the vagina, in whom a colon bacillus cystitis, and right-sided pyelitis associated with high fever, repeatedly came on within twenty-four hours after coitus. An interesting circumstance in connection with the author's cases is that the pyelitis was always right-sided. This would seem to corroborate some recent studies which C. Franke² has made concerning the communication existing between the lymph vessels in the region of the cecum and the capsule of the right kidney.

Sippel,³ of Frankfurt-am-Main, writing on the same subject, states that he has frequently observed cases of colon bacillus infection of the bladder occasionally complicated with pyelitis in young women recently married. He does not, however, believe that infection invariably takes place through injuries to the hymen, but that it is carried rather by direct contact to the urethral orifice, whence it ascends. He has observed that all the women affected with this form of cystitis have had a high rigid perineum and a small introitus, so that the meatus lies somewhat behind the entrance to the vagina. Until the perineum has been somewhat drawn back, the introitus does not come entirely into view. When this manipulation is carried out, however, the anterior vaginal wall and meatus are seen to bulge out into the opening. From these conditions it naturally follows that contact with the meatus must occur during intercourse, with the result that a contamination can readily take place. It is probable that the infection is first derived

¹ Correspondenz-Blatt f. Schweizer Aerzte, January, 1912.

² Münch. med. Woch., 1911, No. 43.

³ Deutsch. med. Woch., June 13, 1912.

from the perineum during attempts at intromission, and then carried by the penis to the urethral orifice. The author believes that his opinion as to the method of infection is corroborated by the fact that he has seen several recurrences take place, each one following the sexual act. In all of these cases any lacerations of the hymen which may have been present at first had become completely healed. For these reasons Sippel prefers the terms "cohabitation cystitis and pyelitis" to those suggested by Wildbolz.

Wildbolz makes the timely suggestion that more attention should be given to the complaints which newly married women make about difficulty in urinating. If a careful examination be made of such patients and their urine, a colon bacillus infection may be discovered to be the cause of the trouble. Too little importance has been attributed to cases in which neither history nor evidence of gonorrhea could be elicited.

As regards treatment, both authors found that early cases were cured by irrigations with boric acid solution and the internal administration of urotropin. Judging by the reports concerning aluminum acetate in colon bacillus infection, a solution of that substance should prove valuable.

Rapid Diagnosis of Urinary Tuberculosis. Heitz-Boyer¹ has used the antigen reaction of Debré and Paraf for the detection of renal and vesical tuberculosis, and believes it to be of considerable value. This is a method similar to the Wassermann test, although the reaction is based upon derivation of the antigen rather than of the antibody. The technique is given in detail. The method was tried in 43 cases. There were 11 cases in which it was positively known that tuberculosis was present, which were used as control; 17 doubtful cases in which the patients had purulent urine; 7 doubtful cases in which the patients had clear urine, and 8 cases in which, judging from the clinical evidence, tuberculosis was not present. Of the sum total of these cases, the reaction was positive in 25 and negative in 18. In 22 of the 25 positive cases, tuberculosis was proved to be present by other methods, such as the detection of the bacillus, inoculation of guinea-pigs, or examination of tissue removed either at operation or autopsy. In 2 of the remaining cases other tests were not made, and in 1 the various methods did not give the same results. Chevassu also reported the results he obtained with the method, having used it in 44 cases, in 29 of which it was possible to examine the organs supposed to be diseased either at operation or at autopsy. In 10 subjects, nephrectomy revealed renal tuberculosis. These had all given a positive antigen reaction, and with the exception of 1 they were all considered clinically as cases of renal tuberculosis. One patient was operated upon for what was supposed

¹ Jour. Urol. Med. et Chir., January 15, 1912; La Presse Méd., February 28, 1912.

to be a pyonephrosis, and it was a positive antigen reaction which showed that the pyonephrosis was nothing but an acute manifestation of a developing tuberculosis. In 5 subjects the reaction was negative, and later evidence gained at the operating or postmortem table showed that there were no tuberculous lesions present. In 8 other cases the test was positive in 6 and negative in 2, and in only 1 of these did it seem that the result shown was erroneous. Of 15 reactions controlled by inoculation of guinea-pigs, there were 13 which proved to be correct and 2 incorrect. The test was also tried without verification in a number of other patients who presented positive clinical evidence of tuberculosis and also on patients known to have other diseases, such as prostatic abscesses and vesical calculus, for example. In these, it seemed to work in accord with the conditions known to be present, usually being positive in well-defined cases of tuberculosis and negative in those in which other conditions were present. In summing up, the author states that in 37 of the 44 cases the test proved to be correct, in 3 probably incorrect, and in 4 it could not be verified. He considers it superior to any laboratory method which at present is at our command.

Hematuria in Appendicitis. Von Frisch¹ has reported 2 cases of profuse hemorrhage from the kidney occurring in appendicitis, which were characterized by the circumstances that the hemorrhage invariably supervened immediately after the appendicular colic, that it disappeared after a few days, the urine becoming perfectly clear and free from albumin, and that the profuse sediment found in the deeply colored urine consisted almost entirely of blood cylinders. Both cases came to operation, and as the appendix in each was external to the kidney and was not adherent to that organ nor to the ureter, a direct extension of inflammation from the appendix to the kidney could not have been the cause of the hemorrhage. A satisfactory explanation of this form of hemorrhage the author believes cannot at present be made.

Radiography and Pyelography. A. B. Moore² has described the technique employed in making x-ray examination of the kidneys and ureters in Mayos' clinic. He considers it of the utmost importance to have the intestinal tract free from fecal matter and gas, and, in order to accomplish these desiderata, does not allow the patient any food for twenty-four hours before the examination is to be made, and also gives a purge twelve hours before and an enema one hour before. For the examination the patient is placed in the horizontal position, with thighs flexed so as to relax the abdominal muscles and bring the kidney as near to the plate as possible. He is then told to draw in

¹ *Folia Urologica*, November, 1911.

² *The Journal of the Minnesota State Medical Association and Northwestern Lancet*, November 1, 1911.

the abdomen and hold his breath so as to fix the diaphragm, and thus place the kidneys more at rest. The distance between the tube and the plate is also reduced to a minimum when this is done. Two exposures are made, one with the tube focussed over a point in the midline of the body midway between the xiphoid cartilage and the umbilicus, and the other with the tube focussed over a point midway between the umbilicus and symphysis and inclined down toward the symphysis. The first of these plates includes both the kidney areas and the upper half of the ureter. The second, the lower half of the ureter and the bladder. The exposures vary from one to three seconds. The picture is not considered satisfactory unless it shows clearly the two lower ribs and margins of the psoas muscles in the kidney region, and the pelvis in its longest diameter in the bladder region. A solution of collargol is frequently injected into the ureter and pelvis of the kidney through a ureteral catheter, and the author considers such a procedure of the greatest value in securing better pictures of the organs.

After comparing the merits of pyelography with those of other methods of diagnosis, Victor Blum¹ concludes that the former method leaves much to be desired. He calls attention to the fact that it is not without danger, and cites a fatal case of collargol poisoning which occurred in the practice of Roessle, as well as serious accidents following its use by Oehlecker and Foelker. He also states that collargol may invade the parenchyma of the kidney, extending even to the capsule, that it may infiltrate the lymphatic vessels, and thus give rise to secondary necrosis of the tissues. To avoid these dangers, he advises that the injection should always be given without any pressure, that it should be followed by a lavage immediately after the pyelography, and that it should not be used at all in cases in which the pelvis of the kidney is dilated. Its use in tuberculosis is considered not only useless but dangerous, for the reason that it might result in deposition of tuberculous debris in healthy parts of the kidney. For the diagnosis of ureteral dilatation, radiography on a metallic ureteral sound is considered the best means, as it is likewise for the detection of deviations of the ureter.

Ureterostomy. K. Frank,² of Vienna, has recently reported 4 cases in which this operation was done with satisfactory immediate results. After reviewing the different methods which have been employed for diverting the urine from its natural channels, he concludes that the establishment of a superficial fistula by bringing the divided ureter out through the skin is the best. Of the 4 cases which he reports there was 1 in which the operation was done for a malignant tumor of the prostate, 1 for infiltrating cancer of the bladder, 1 for contrac-

¹ American Journal of Dermatology and Genito-Urinary Diseases, March, 1912.

² Deutsche Zeitschrift f. Chirurgie, February, 1912, cxiii, fasc. 5-6.

tion of the bladder, and 1 for superficial vesical epithelioma. In his first case a double lumbar ureterostomy was done. In the other 3, the ureters were attached to the skin of the anterior abdominal wall above the anterior superior spine of the ilium. The fixation was accomplished by suturing the ureter to the aponeurosis of the external oblique muscle and allowing about 1 cm. to protrude beyond the integuments. Frank considers this anterior method preferable to the lumbar one because a urinal can be held in place better in the former region. In all of his cases, the pyelonephritis which had been present before the operation underwent rapid improvement afterward.

Reconstruction of the Ureter. Last year the use of segments of veins in reconstructing the urethra was mentioned. Recently, Dominici,¹ one of Alessandri's assistants at the University of Rome, has published results of some experiments which he carried out on dogs, in which segments of veins and arteries were used in reconstructing ureters which had previously been resected. In 7 cases veins were used; in 3, arteries. In 7 cases the sutures remained in place and no urinary fistulæ resulted. In the 3 successful cases a piece of the internal jugular vein was used in 2, and a piece of the long saphenous vein in the other. Failure of union was attributed to the difference in the caliber of these vessels and the ureters. The common carotid artery and the external jugular and femoral veins were used in the successful cases. When the tissues were examined at periods varying from three to fifty-seven days after the operation, it was found that the transplanted vessel holds fast at first, then necroses rapidly, and is finally replaced by interstitial tissue. In considering the different results obtained by uniting segments of bloodvessels with bloodvessels from those obtained by making the anastomosis with the ureter, the author states that the failure of primary union which occurs in the latter is due to the lack of circulating blood; that is to say, that the necrosis of the transplanted vessel takes place before sufficient vascular communications have been formed between the vessels and the ureter.

Exstrophy of the Bladder. The careful dissection of 5 subjects affected with complete exstrophy of the bladder has enabled A. Hovelacque,² of Paris, to consider the morbid anatomy of this condition in detail, as a result of which he has been able to throw some light upon certain conditions, such as anomalies of the umbilical vessels, bony malformations of the pelvis, and the arrangement of the muscles and fasciæ of the perineum, which had been previously surrounded with more or less obscurity, and also to offer some suggestions, based upon his findings, as to the surgical treatment of this condition.

In all his cases the recti muscles were found inserted upon the

¹ *Folia Urologica*, November, 1911.

² *Jour. d'Urol., Méd. et Chir.*, January 15 and February 15, 1912.

inguinal surface of the pubis and not into the aponeurosis of the other abdominal muscles, as Meckel thought they frequently were. The bladder wall was invariably found to be hypertrophied, and a certain degree of chronic cystitis was present. The peritoneum was only slightly attached to the bladder wall. In 2 of the subjects there was an epitheliomatous degeneration.

The abnormal curve described by the ureters is of importance from the standpoint of operation. Inasmuch as they are from 5 to 8 cm. longer than normal, it is necessary to resect a considerable portion of them in order to prevent kinking and the urinary stasis and infection

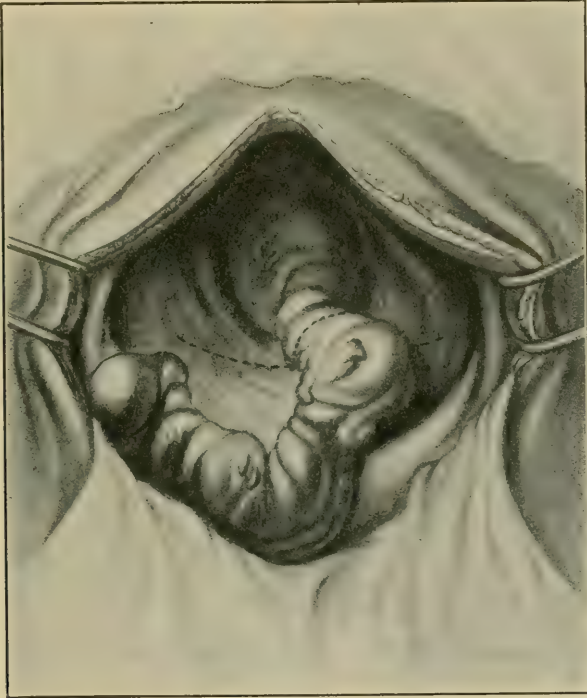


FIG. 9

which have followed in a large percentage of cases subjected to various operative procedures. The ureters were also found dilated in these 5 subjects, even in the children. Consequently the author concludes that the condition is a constant one, since others as well as himself have found it, and he considers it to constitute an additional indication for partial resection.

The blood supply of the ureters was found to be very complex. There was one long artery coming from the renal, and also a branch from the spermatic and one from the aorta, going to the lumbar portion. The pelvic portion was supplied by small branches from the sciatic,

the internal pudic, and particularly in the part near the bladder, by branches of the umbilical. This latter circumstance shows that the blood supply of the ureter cannot be seriously interfered with by resecting its lower part.

A most complete study of the malformations of the bony pelvis was made by the author. He found that the sacrum was flattened, there being hardly any concavity. The angle between the sacrum and the coccyx was almost 90 degrees, the coccyx being displaced forward in such a manner as to make the perineum much smaller. This latter condition, of course, has been observed by other investigators. There

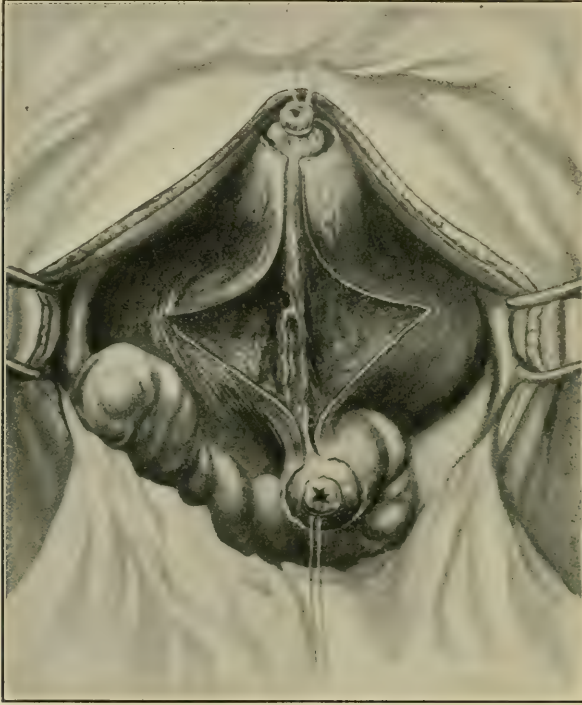


FIG. 10

was no downward displacement of the ischium such as has been found by others who have examined the pelvis in such subjects. The tuberosity of the ischium, however, was larger than normal. The interpubic ligament, upon which so much importance has been placed by previous writers, was not found in any of the dissections. What actually existed was a displacement of the pubovesical ligaments resulting from the abnormal position of the bladder.

Although the perineum was abnormally small from before backward, the muscles were well developed and strong. This finding is contrary to that given in the classical descriptions, but it is important from

the standpoint of surgery, because it justifies those operative procedures which depend upon the principle of transforming the rectal pouch into a reservoir for the urine and of replacing the absent vesical sphincter by the sphincter of the anus. Moreover, they contraindicate division of the bony pelvis and the opening of the sacro-iliac joint that has been practised in some operations for the purpose of bringing the margins of the vesical opening together. The latter might cause relaxation of the perineum, which acts as a true anterior sacro-iliac ligament, and thus result in secondary separation of the bones.

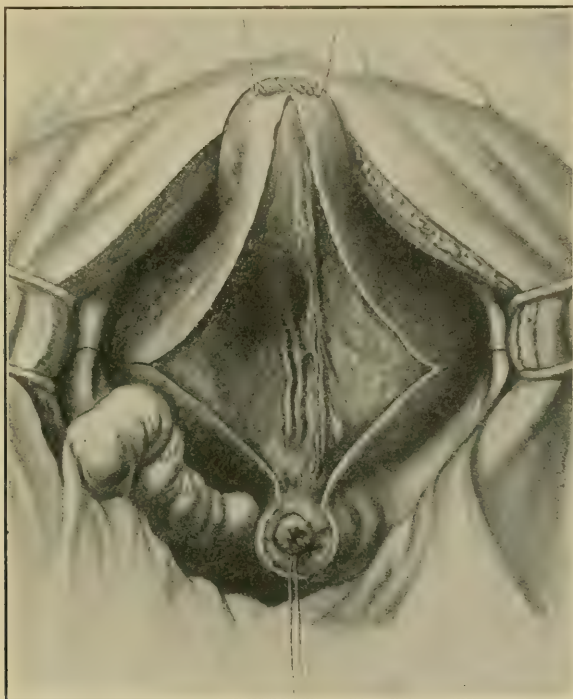


FIG. 11

Heitz-Boyer working in association with Hovelacque, has described an operation for this malformation. In the first place a bilateral nephrostomy is done three weeks before the operation is undertaken, so that the urine may at first be kept out of the new bladder. Then after the rectum has been emptied and disinfected as well as possible, the abdomen is opened by median incision, and the lower bowel divided at the level of the third sacral vertebra. This incision, which at first goes only through the serous coat, is carried over onto the pelvic peritoneum on either side, after which the peritoneum is stripped away above and below for about 2 cm., care being taken to save all the

bloodvessels going to the posterior part. After this has been done, the bowel is divided between two ligatures with a thermocautery.

The lower end of the bowel is invaginated with a series of Lembert sutures, and the upper end, covered with gauze, is brought down until it reaches the anus. In order to make this latter manœuvre possible, the rectal space is deepened until it reaches the tip of the coccyx. This dissection is made to the left of the superior hemorrhoidal vessels which, if possible, are left intact.

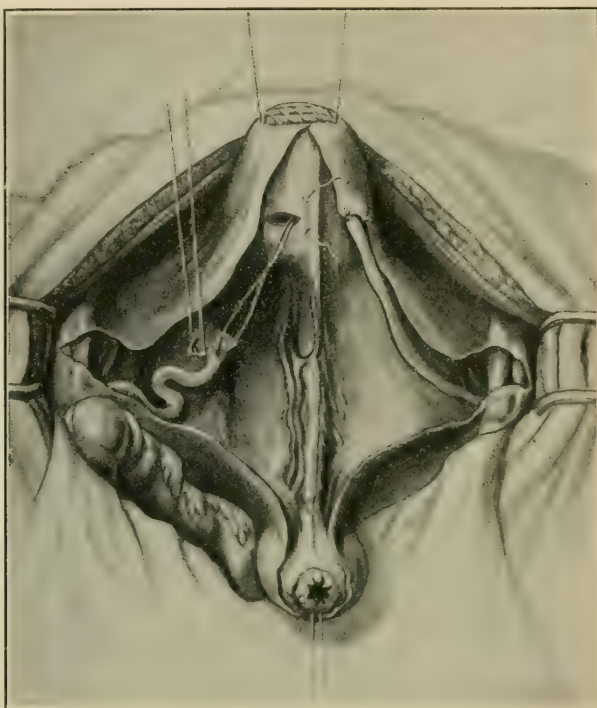


FIG. 12

The next step consists in dissecting out the ureters, which are located through the transverse peritoneal incision previously made; they are resected in such a manner that they shall not be long enough to kink or short enough to cause traction upon the sutures used to implant them into the new bladder. The implantation is made at the junction of the posterior and lateral surfaces of the rectum. This site should be at least two fingers' breadth from the summit of the bowel.

The abdominal part of the operation is finished by uniting the flaps of peritoneum, beginning in the midline and going outward first to one side, then to the other.

The perineal part of the operation consists of four distinct stages:

1. Dissection of the anorectal mucous membrane.
2. The retrorectal incision.
3. Invagination of the upper end of the bowel into the anus.
4. Placing the sutures.

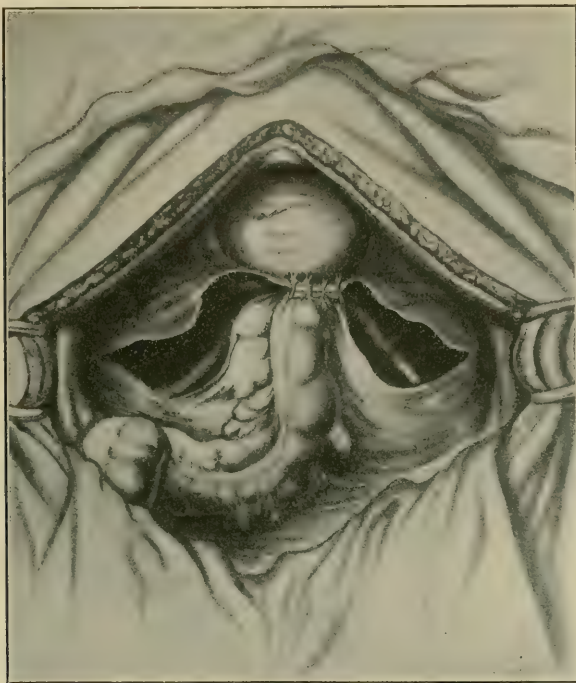


FIG. 13

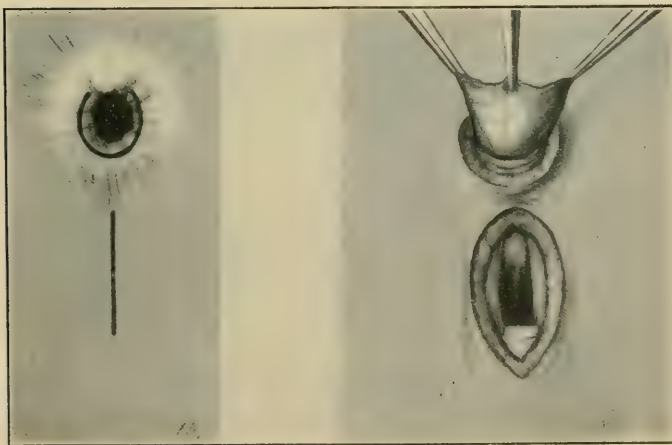


FIG. 14

FIG. 15

The liberation of the anorectal mucous membrane is made around the posterior four-fifths of the anus, and is carried upward for a distance

of about 5 cm. This dissection is difficult both on account of the delicacy of the mucosa itself and its close attachment to the external sphincter.



FIG. 16

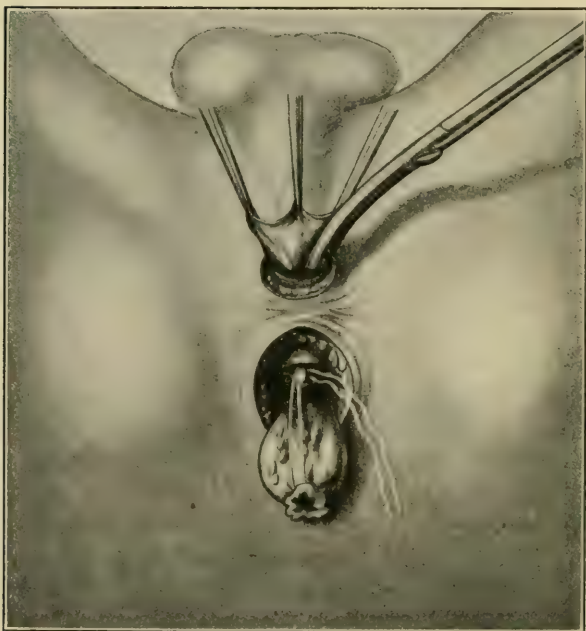


FIG. 17

After it has been dissected free, the retrorectal incision is made. It begins 2 cm. behind the anus, and is carried downward to the base of the coccyx, the anococcygeus muscle is divided, the coccyx resected, and the retrorectal segment of the pelvic aponeurosis is broken through or cut, as is done in the Hochenegg-Kocher operation for resection of the rectum. Through this retrorectal incision a transverse cut is made on the posterior surface of the rectum, which is lifted up by the index finger and introduced between the mucous membrane, which has been dissected up, and its muscular wall. This cut should be a little less in length than one-half of the circumference of the bowel, and it should be made as close as possible to the sphincter. Through this transverse incision the end of the superior coil of bowel is drawn, being thus invaginated into the posterior two-thirds of the original anal canal.

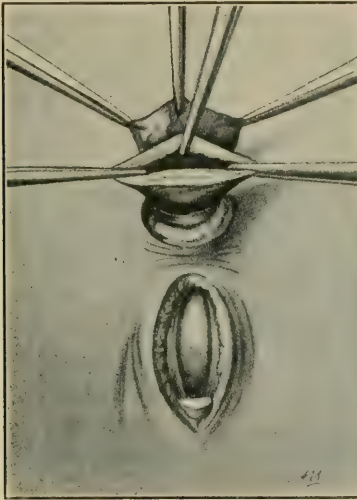


FIG. 18



FIG. 19

First, a deep layer of sutures fastens the anterior surface of the sigmoid flexure to the posterior surface of that part of the bowel which was originally the rectum. A few additional sutures fasten the dissected anorectal mucous membrane to the anterior surface of the sigmoid flexure. In this manner the new ano-urethral partition is formed. The inferior opening of the sigmoid is now sutured to the posterior four-fifths of the skin around the site of the anus. It will be remembered that the anterior fifth of the anal canal was not disturbed. This now serves as the new urethral opening.

In front, a few sutures unite the free border of the new anal canal with the anal mucosa previously dissected off. To prevent the ascent of this new partition, a U-shaped suture is placed at each angle. The

retro-anal wound is drained, a tube is also placed in the new rectum, and a large flexible sound in the new meatus. The anal tube is removed after two or three days, but the sound is left in place for about a week. Usually by the end of a month the anus will have assumed its normal aspect; and when the integrity of the new bladder has been determined the two renal fistulæ in the loins should be allowed to close. The operation is long, taking at least one hour and a half, and the patient will probably suffer somewhat from shock, for which caffeine, camphorated oil, and other stimulants are to be used as required. The bowels are not allowed to move for at least ten days after the operation.

A patient operated upon according to this method by Marion now has a bladder which will hold 200 c.c. During the day the patient has control over it, although she is obliged to urinate every two hours. Neither gas nor fecal matter have ever been discharged from the new reservoir. The function of the rectum also is perfect. During the night a little urine escapes, probably owing to the fact that control over the new bladder is partly voluntary. It has more recently been suggested by Lastaria,¹ of Naples, that this nocturnal incontinence might be done away with if the entire thickness of the bowel wall be not sewed into the anus. He thinks it would be well to remove the serous and muscular layers for a distance of 3 or 4 cm., and then fasten the submucous and mucous layers thus denuded into the anus. Such a segment, being thinner, would not be so liable to interfere with the action of the sphincter.

Diverticulum of the Bladder. An ingenious operation for this condition has been described by William Lerche,² of St. Paul, Minnesota, who succeeded in introducing into the diverticulum a small rubber bag securely fastened to the ureteral catheter with a silk thread and then kept in place by means of a small rubber band which was slipped over it. After the bag was put into the diverticulum, 200 c.c. of boric acid solution was injected into it through the catheter, while the same amount was allowed to run out of the bladder, leaving about 150 c.c. of the quantity previously injected into the viscus. The distended diverticulum was easily palpable through the rectum. Under ether anesthesia an incision 10 cm. long was made through the left rectus muscle, and the pelvis entered outside of the peritoneum, which was then stripped off from the left side of the bladder and pelvic wall until the diverticulum was reached. It was found impossible to separate the diverticulum from the peritoneum for more than half the distance around its walls, so the outer layer of the wall was incised and was then shelled out. The left ureter was found opening on the mesial

¹ *Riforma Medica*, 1912, No. 6.

² *Annals of Surgery*, February, 1912.

wall of the diverticulum, and the left seminal vesicle was behind and below it. The rubber bag was emptied, and after the neck of the diverticulum had been cut through on the left side the bag and the catheter were taken out through the abdominal incision. The diverticulum was removed, the wound in the bladder sewed up with two layers of formalized catgut sutures, and the left ureter implanted into the bladder through the same incision. The extraperitoneal cavity was drained and a retention catheter was left in the bladder. As vesical contractions interfered seriously with drainage of the bladder, posterior urethrotomy was performed and a large tube put into the bladder through the perineal incision. The neck of the bladder was found rigid and fibrous, so three weeks after the patient left the hospital, which was on the thirty-fourth day after the operation, a portion of the contracted vesical neck was removed under local anesthesia with Young's mesial prostatic bar excisor.

The author states that distention of the diverticulum with a rubber bag made the operation very much easier than it otherwise would have been.

Accompanying his paper there is a résumé of 14 cases in which radical operations have been done. He also discusses the etiology and pathology of the condition.

Tumors of the Bladder. Judging by all reports, the *fulguration treatment of tumors of the bladder*, introduced by Beer, of New York, about three years ago, bids fair to displace methods previously in vogue. This seems to be especially true as regards papillomas, although more time must elapse before conclusive results can be obtained in any great number of cases. The reports thus far available are very encouraging.

A number of surgeons have reported one or more cases of neoplasms treated by this method. At the Chicago meeting of the American Urological Association the operative treatment of vesical papillomas was discussed by Bremerman,¹ of that city. He reported 7 cases operated upon by the suprapubic method and 5 treated by fulguration. Among the first group 5 died, probably from malignant recurrence of the growth, 1 is still living and in good health, and 1 has been lost sight of. Of the 5 patients treated by fulguration, there have been no deaths and no recurrences thus far. This method is considered preferable to the cutting operation, the results obtained being remarkable, although, of course, the author admits that sufficient time has not elapsed as yet to enable him to make a positive statement with reference to the permanency of the cures. In the discussion which followed, Squier stated that he has had 1 case of papilloma which recurred three months after its presumably complete removal by fulguration. Keyes, Jr., of New York, stated that he has treated about a dozen cases of papillomas

¹ Transactions of the American Urological Association, 1911, vol. v.

by the fulguration method, and is of the opinion that the results will be superior to those which have been obtained with the suprapubic operation.

James A. Gardner,¹ of Buffalo, also reports 5 cases, B. A. Thomas,² of Philadelphia, 4 cases, and D. A. Sinclair,³ of New York, 2 cases in which results up to the time of their reports were very satisfactory. The technique of this method is not complicated. An insulated copper wire is passed through the catheter channel of the cystoscope, and is then pushed directly into the tumor, after which the current is turned on for periods of five seconds several times in succession. The burned tissue adheres to the electrode so that it does not have to be removed by other instruments. The operation is painless, but great care should be taken not to let the electrode touch the healthy bladder mucosa, which is very sensitive to its action. Some pain is experienced toward the end of the treatment after the greater part of the tumor has been destroyed by repeated applications. This is due to closer contact of the electrode with the bladder wall itself.

Victor Blum⁴ has reported 52 cases in which the intravesical method of removing neoplasms and foreign bodies was employed. There were 44 cases of tumor, of which 37 were papillomas. Seven other cases in which fragments of tumor had been removed were found to be carcinomatous, and the radical suprapubic operation was employed. In the 37 cases of papilloma, the complete operation was done only in 30, for the reason that the patients refused to submit to any further procedure, owing to the continuance of hemorrhage or other symptoms. The author describes his technique in detail, and also discusses the relative merits of the two types of operating cystoscopes. Naturally he considers his own the better. He used an instrument having a movable tip. As regards recurrences, there were only 2 cases in which it was known to have taken place.

Heresco,⁵ of Bucarest, has reported another case of total cystectomy followed by complete operative recovery. The operation was performed upon a woman, aged fifty years, who had suffered with severe hematuria for three years, together with frequent and painful micturition and hypogastric pain radiating to the lumbar region. Bimanual palpation revealed the presence of a movable tumor which seemed to take origin from the bladder. Cystoscopy was impossible, however, because of the profuse hemorrhage. In November, 1911, a suprapubic cystotomy was done, and as soon as the bladder was opened a tumor, which appeared to be myxomatous, was brought into view. In order to

¹ American Journal of Dermatology and Genito-Urinary Diseases, March, 1912.

² Surgery, Gynecology, and Obstetrics, April, 1912.

³ American Journal of Urology, March, 1912.

⁴ Zeitschrift f. Urologie, 1911, Band v, Heft 10.

⁵ Spitalul, January 1, 1912.

prevent inoculation of the wound with tumor cells, the vesical incision was immediately closed, and the removal of the entire bladder was undertaken. The peritoneum was stripped off, the bloodvessels and ureters ligated, and the viscus removed after a clamp had been placed close to its neck. The ureters were sutured into the wound and a catheter inserted into each one of them, after which the cavity left by the enucleation of the bladder was packed with gauze. The case was reported two weeks after the operation. At that time the patient was in such good condition that the author considered her well. The urine was normal in quantity and was free from any pathologic elements.

Incontinence of Urine in Women. At the meeting of the German Urological Society a contribution to the treatment of incontinence of urine in women was made by Casper,¹ of Berlin, who stated that he had often been disappointed with the usual measures employed for overcoming this troublesome affection. A new method which has given him good results is cauterization of the internal sphincter, which is done by making two or three applications with the cautery under direct guidance of the eye through the operative cystoscope. It has been found that the scar left after the slough has come away produces enough retraction to keep the bladder completely closed. Occasionally a repetition of the treatment is necessary. The same treatment, once repeated, produced a permanent cure in one case of nocturnal enuresis. In the discussion which followed von Frisch stated that he had never failed to produce good results with paraffine injections and dilatation of the urethra, which Casper had often found deficient.

Eugene H. Eising² reports 2 cases of incontinence resulting from injury to the urethra in which the injection of paraffine produced complete cure. Both of these patients suffered from incomplete retention. One was a woman, aged thirty-six years, whose trouble came on after childbirth. Local treatment and a number of operations had been done without result. In October, 1911, Eising made a submucous injection of paraffine parallel to and along the urethra. This injection was followed by considerable reaction, but from the very beginning the dribbling was controlled, and at the time he reported the case there had been no return of the incontinence.

The second case also followed childbirth. Operations had also been done without any effect, and consequently the paraffine injections were tried. Two injections were only partly effective, but the third one was followed by complete relief of the incontinence and voluntary control over the bladder. The author used ordinary commercial paraffine. He does not consider the use of a special syringe necessary if sterilized chamois gloves be worn so as to permit handling of the syringe while it is hot.

¹ *Folia Urologica*, November, 1911.

² *Medical Record*, April 27, 1912.

THE PROSTATE

Prostatectomy. Reviewing the contributions to prostatectomy which have been made within the last two or three years, one is impressed with the attention which operators in general are now giving to preliminary and postoperative treatment. Among the contributions which have been made during the last year, those by Cholzoff, of St. Petersburg, Pilcher, of Brooklyn, and Lilienthal, of New York, are of interest.

Cholzoff's¹ method of doing the suprapubic operation in two stages was mentioned in last year's review. As the result of a larger experience and further investigation of the subject, he has become convinced that the suprapubic operation, as ordinarily done, is such a serious one that it cannot be considered free from great danger except in that small class of patients whose general nutrition is good and whose kidneys are unaffected. On the other hand, if it can be divided into two or even three stages, he believes that the dangers are greatly reduced, not only in cases of moderate severity, but even in those occurring in the oldest and most debilitated patients who have advanced organic kidney disease. Therefore, he considers prostatectomy thus carried out as the ideal procedure for all cases. As stated in last year's review, the interval between the primary cystotomy and removal of the prostate varies from three weeks to three months, in accordance with the conditions obtaining in the individual case. Thus modified, the author is confident that the suprapubic operation is less dangerous than the perineal. If this opinion is verified by the experience of other operators, then indeed a great improvement in the suprapubic operation will have been obtained. Cholzoff likewise points out that the functional results of prostatectomy do not always depend entirely upon the removal of mechanical obstruction to urination, but that they may also depend upon the previous condition of the vesical musculature. For this reason it is considered advisable to give the bladder as much rest as possible in order that its action may be reëstablished, and this desideratum, too, he believes is best secured by doing the operation in two or three stages. In exceptional cases he has found that the functional results of the operation may be negative because of a thick transverse scar close to the neck of the bladder, which acts as an insuperable impediment to the passage of urine. This he believes to be a sequel which cannot always be avoided by any operative precautions. The only way in which its effects can be overcome is by secondary operation for removal of the scar and reëstablishment of the passage. With regard to technique, Cholzoff distends the bladder

¹ *Folia Urologica*, December, 1911.

with air before opening it, and after the prostate has been removed he packs the bladder with gauze instead of using suprapubic drainage. Air distention of the bladder and packing of the wound he believes prevents infection of the pelvic connective tissue, and, moreover, he is of the opinion that packing constitutes the best way of arresting hemorrhage. He always operates under local or spinal anesthesia.

Pilcher,¹ who also advocates the two-stage operation in certain cases, lays special stress upon the preparation of the patient, considering it especially important to know the amount of urine voided in twenty-four hours, its specific gravity, and its general characteristics. He also determines the functional capacity of the kidneys by means of the phenolsulphonephthalein test. Moreover, believing that the renal function is considerably influenced by the amount of residual urine, he insists upon the necessity of keeping the bladder empty by catheterization for some time before the operation is undertaken, and in some cases some time before the functional renal test is employed. For this purpose the use of the permanent catheter is recommended. The frequency with which the bladder is emptied varies with the degree of irritability which is present in each case. At first it is only partly emptied, but more and more urine is taken away from time to time, so that after three or four days continuous drainage may be established. Pilcher very wisely points out that prostatectomy is never an emergency operation. Unfortunately there are some, even at the present time, who do not recognize this fact, so that we still occasionally hear of the simultaneous evacuation of 50 or 60 ounces of retained urine, and removal of the prostate through a suprapubic incision. The high mortality following such operations is not at all surprising.

Lilienthal,² writing on the same subject, also lays stress upon the importance of preliminary cystotomy in the case of enfeebled patients who are suffering from the effects of partial or complete retention. He correctly states that the first thing to be sought in such cases is relief from suffering. The operation is performed primarily for that purpose, being done under local anesthesia. If the bladder is distended as the result of retention, the catheter is not used; if emptied, it is inflated with air during the operation, just as the peritoneum is drawn out of the way. The author opens the bladder high up, as advised by J. Bently Squier, believing that an artificial opening thus made will close sooner than one made low down. After rapidly examining the interior of the viscus, drainage is established by means of a rubber tube. In the cases thus treated, shock has rarely been serious. Relief of urinary symptoms and improvement in general health follow, so that removal of the prostate may be undertaken under more favorable

¹ Journal of the Michigan State Medical Society, January, 1912.

² American Journal of Surgery, June, 1912.

conditions. It is done by enlarging the original incision, and gauze packing as well as the drainage is used after the prostate has been removed. The gauze is taken out in forty-eight hours, after which the bladder is irrigated two or three times a day. If suppuration occurs in the prostatic pocket, as occasionally happens despite all precautions, massage through the rectum, followed by intravesical irrigation, is practised twice daily, and has been found to provide sufficient drainage.

Casper¹ still believes that a large percentage of all patients can be kept comfortable by regular aseptic catheterization. In those in whom catheterization fails or is very difficult or painful, as well as those in whom repeated hemorrhages occur or stone formation takes place, suprapubic prostatectomy is considered the best method of treatment. Renal insufficiency is regarded as an absolute contra-indication to operation, and patients who respond negatively to the phloridzin test are treated by permanent catheterization until their condition is so improved that they excrete the normal amount of sugar after injections of phloridzin. If the function of the kidneys is not sufficiently improved, operation is not done. The greatest care is deemed necessary also in dealing with patients who have arteriosclerosis, as it has been found that some who had only slight subjective symptoms from their arterial changes were seized with sudden heart failure after the operation, whereas others who presented serious manifestations withstood both anesthetic and operation nicely. Although the differentiation between such patients is well-nigh impossible, the author believes that determination of the blood pressure may be of some help.

With reference to mortality, it is pointed out that the widely varying percentage of 4 to 20 may be explained by the circumstance that different surgeons operate upon patients whose condition varies greatly. Naturally, those who remove small prostates in comparatively young men who have not had severe symptoms will have a better set of statistics to show than those who reserve the operation for more critical cases. Casper's own mortality rate, in 57 cases, was 18 per cent. This he attributes to the fact that many of his patients were old, debilitated, and affected with organic cardiac disease. The causes of death were as follows: In 3 cases, heart failure; in 2, sepsis; in 2, hemorrhage; in 2, renal insufficiency; and in 1, shock. To overcome such accidents has been his constant endeavor. For the control of hemorrhage the space left by the removal of the prostate is packed with gauze, as is also the space of Retzius; and if the bleeding is not controlled, a rubber bag is introduced into the rectum and filled with water. The pressure exerted by this means has frequently caused immediate cessation of the hemor-

¹ *Zeitschrift f. Urologie*, 1912, Beiheft 2.

rhage. For the prevention of sepsis, continuous irrigation by means of an automatic irrigator is employed.

Casper's experience with spinal analgesia has been so unsatisfactory that he no longer uses it. In 4 of the cases in which it was employed the patients collapsed, and 1 of them died. At present he uses general anesthesia, preceded by scopolamin and morphine.

Colmers,¹ of Coburg, is much pleased with a method of local anesthesia which he has of late been using. After injecting the perineum just in front of the anus with a 0.5 per cent. solution of novocain, he introduces a long needle into the connective tissue between the prostate and rectum and injects about an ounce of the same solution, some of which is deposited centrally and some to each side of the prostate. The abdominal wall is then injected from skin to preperitoneal tissue, and about half an ounce of the solution is deposited in the space of Retzius. The operation is begun ten or fifteen minutes after the injection has been completed. Before the bladder is opened about a dram of the solution is injected into the substance of its wall. It is stated that patients thus prepared do not feel any pain, although they are conscious of a sensation of pressure while the prostate is being enucleated. Postoperative pain comes on in from three to five hours. In addition to the preparation already described, a dose of pantopon is given one hour and one-half hour respectively before the operation, and in the case of patients who are not too debilitated, a small dose of scopolamin is also administered. Three ounces of 1 per cent. eucaïne solution are injected into the bladder, and a clyisma of antipyrine is also given. These measures quiet the patient and make infiltration of the tissues easier.

Bremerman,² of Chicago, has devised an apparatus for draining the bladder after suprapubic prostatectomy. The tubing of the apparatus is connected with the drainage tube in the bladder. The tube must be below the level of the patient's body. The container is filled with water and the stop-cock turned so that the water will drip into the cup, which, when full, tilts itself and empties into the funnel. The fluid running down the long tube into the lower tube causes sufficient suction to start siphonage of the fluid in the bladder. The siphonage can be regulated to occur at any given interval by arranging the flow of the water from the stop-cock. The drainage thus secured is said to make the patient more comfortable and another advantage resulting from it is that the dressings do not become wet.

The amount of urine is estimated by first measuring the fluid in the reservoir and then measuring that which is contained in the vessel under the bed, the difference between the two represents the quantity of urine.

¹ Zeitschrift f. Urologie, 1912, Beiheft 2.

² American Journal of Urology, June, 1912.

Leonard Freeman,¹ of Denver, has recently described a method of controlling hemorrhage after suprapubic prostatectomy which appeals to me as being an admirable one. In order to prevent the gauze packing from becoming loose and falling back into the bladder, he has conceived the idea of holding the gauze in place and also exerting pressure upon it by means of large forceps applied to its distal end. The handles of the forceps come out through the opening in the bladder wall and extend for some distance beyond the abdominal incision. Pressure can be maintained by passing a rubber binder around the patient's body and over the notch between the handles of the forceps. Gauze pads are placed around the handles in such a way as to exert pressure in any direction desired. The dressing is fastened in place in the usual manner. If this method results in controlling some of those occasional untractable cases of bleeding after suprapubic prostatectomy, it will certainly be appreciated by those who have seen their patients become weaker and weaker, and finally succumb to loss of blood.

The Immediate Results of Prostatectomy. At the last meeting of the International Congress of Urology at London, Zuckerkandl² made a report on 94 prostatectomies which he has done. The patients were selected with care, and comprised those suffering from all degrees of urinary retention. Sixteen of the number died. Perineal prostatectomy gave a mortality of 9.5 per cent., in contradistinction to which the lowest figure obtained by the suprapubic route was 18.7 per cent., these latter figures being based upon cases operated upon in recent years. Of the patients who survived, it was possible to learn the condition of 66 at the end of the year 1910. The health of a small percentage of those who were subjected to the perineal operation was seriously affected by the formation of fistulæ and incontinence of urine. In a few cases impotence followed the perineal operation, but in a certain number there was evidently no impairment of vigor. The sexual functions were certainly not impaired by the suprapubic operation, and the author believes that in a few of his patients some increase in vigor took place. Cicatricial contractions following prostatectomy are considered to be rare exceptions, and are believed to be dependent upon some faulty method of enucleation. The author found that the prostatic urethra, the neck of the bladder, and trigonum were so perfectly restored after the operation that cystoscopic examinations did not show any change from the normal conditions. In those who survived the operation, all symptoms were relieved and no recurrence has been noted. The author considers prostatectomy curative in the true sense of the word, and despite the fact that the suprapubic operation still has a higher mortality rate than the perineal, he considers it preferable, as in his experience it gives much better functional results.

¹ Surgery, Gynecology, and Obstetrics, January, 1912.

² Ann. des Mal. des Org. Gen.-Urin., November, 1911, No. 1.

Prostatic and Periprostatic Suppurations. Victor Blum¹ has reported 7 cases of prostatic and periprostatic suppuration. The most frequent cause of these conditions is gonorrheal urethritis, although they have been known to follow the use of dirty instruments. The infection is conveyed through the urethra to the prostate, where it gives rise to a lymphangitis or periprostatic thrombophlebitis, which in turn produces a phlegmon. The abscess may form in front as well as laterally or posteriorly, in which case it invades the space of Retzius. More frequently, however, it is posterior and tends to work its way toward the rectum. With the exception of those cases in which spontaneous opening into the peritoneal cavity or bladder takes place the prognosis of the gonorrheal cases is good. On the other hand, abscesses of non-gonorrheal origin occurring in patients of advanced age are very serious, as they may cause a fatal septicemia. The treatment, of course, is always surgical, even after spontaneous opening has occurred. The author states that drainage may be rectal or perineal. My own belief is that these abscesses should always be opened through the perineum by the straight median incision or the pre-rectal incision, according to the indications in the individual case.

Thevenot and Rey² report a case of abscess of the iliac fossa which occurred in an old prostatic who had suffered from several attacks of suppurative prostatitis, and who finally was seized with high fever associated with inguinal pain and flexure of the thigh, which assumed the position of abduction and external rotation. There were no signs of local trouble present except a low grade inguinal adenitis. The patient died, and at autopsy a large accumulation of pus was found between the iliopsoas muscle and the bony wall of the iliac fossa. The authors record several cases of the same kind. They are of the opinion that the infection is carried by the lymph channels and that there is not a direct extension from the prostate to the iliac fossa. All the cases have occurred in debilitated subjects. Their development is insidious and the diagnosis is difficult. When they are situated below the muscle the authors believe that incision followed by prolonged drainage is the proper treatment.

Thiosinamin in Prostatic Infections. Ullmann,³ of Vienna, contributed a paper on this subject at the last meeting of the German Urological Society. He has employed thiosinamin in 80 cases in the form of intramuscular injections, each containing 0.2 or 0.3, having given from ten to thirty injections in each case. There have been no local or general disturbances whatsoever, although it produced no effect in hypertrophied prostate or in very chronic post-gonorrheal enlargement. It did some good in many cases in which there were chronic

¹ Wien. med. Wochenschrift, 1911, No. 37.

² Lyon Chirurgical, December, 1911.

³ Folia Urologica, November, 1911.

thick infiltrations which had proved resistant to massage. Lohnstein stated that he had cured an infiltration behind the colliculus and also a case of traumatic stricture in a female by giving thiosinamin, which was the sole treatment employed.

Carcinoma in a Youth. Gardner and Cummings,¹ of San Francisco, have reported a case of prostatic carcinoma in a boy aged seventeen years. The patient became ill about seven weeks before he was admitted to the hospital, having been seized with sharp cramps in the lower left side of the abdomen, which were later accompanied by vomiting. The pains radiated to the left testicle and incontinence of urine developed, although there was no hematuria. A decided loss in weight also took place. Upon admission rectal examination, showed an enlarged, hard and nodulated prostate, which was diagnosticated as sarcomatous.

The patient died about three months after admission to the hospital. At autopsy, the prostate was found to be carcinomatous, as were also the retroperitoneal lymph nodes.

Such a case is unique, and for that reason I deem it of sufficient interest to be mentioned in this review. It only corroborates our recently acquired knowledge to the effect that carcinoma is not invariably a disease of middle life. Carcinoma of the breast occurring in young women under twenty-five years of age is no longer considered of great rarity, and that it may attack the uterus of women of the same age also is now well known. It would be interesting to watch the literature for reports of cases of prostatic carcinoma in young men.

THE URETHRA

Hypospadias. Eric Beck,² in discussing the present status of the operation for hypospadias, states that dislocation of the urethra, according to the method of Carl Beck, affords a positive cure in the balanic type, and also in some cases of the penile form in which the unnatural opening is not too far removed from the tip of the glans. He furthermore states that sufficient time has not elapsed to show whether the urethra will adjust itself in cases in which the operation was done in infancy or very early childhood. In the penile cases there has always been some incurvation when the organ became erect, and in some cases even in its flaccid condition. He has observed 3 complete failures due to unruliness of the patients. Twenty cases were studied.

Persistence of the Gonococcus in the Male Urethra. E. L. Keyes, Jr.,³ after studying this subject for ten years, has come to the conclusion that the gonococcus does not persist in the male urethra for more than

¹ Journal of the American Medical Association, April 27, 1912.

² Medical Record, October 7, 1911.

³ American Journal of the Medical Sciences, January, 1912.

three years, and that in 90 per cent. of all cases, either with or without treatment, it disappears within one year. This latter opinion, however, is one which the experience of others may not confirm. While not overlooking the possibility of fresh infection in subjects affected with chronic urethritis, it would seem that there are a considerably greater percentage of patients than that mentioned by the author in whom the specific microorganism can be found if carefully searched for. It cannot be denied, however, that the author's failure to find a single exception to these rules is of certain significance. In discussing the question as to when a male urethra is absolutely free from gonococci, Keyes states that patients can be divided into four classes. First, there are those who apparently have been cured of their gonorrhea for more than three months, and who do not have any purulent discharge, filaments in the morning urine, or pus in the secretion obtained by massaging the prostate. Such patients can safely be pronounced cured after the physical examination. In a second class of patients who have apparently been well for less than three months, the clinical examination should be supplemented by a very careful search for the gonococcus after the patient has gone at least two weeks without taking any treatment. It seems to me that to pronounce such patients absolutely well will sometimes lead to disappointment, as I have occasionally seen relapses take place after a patient has gone longer than two weeks without any treatment, the trouble being due in all probability to the liberation of gonococci from some hidden focus, such as the glans Littre or the prostate. His third class of patients is made up of those who, though having a slight opalescent drop at the meatus in the morning, and also some filaments in the urine, do not have any free pus in the prostatic fluid secured by massage. Such patients are generally free from gonococci, but in their cases the most minute laboratory examination should be made. It is in such cases as these that I believe the culture methods to be exceedingly valuable. Secretion obtained by irritating the urethra with nitrate of silver in such cases has not uncommonly given me a positive result when repeated examinations made prior to such procedure invariably yielded a negative one. In his fourth class of patients Keyes places those who have free pus in the urine derived most probably from the prostate and seminal vesicles. For these patients the most painstaking laboratory examinations are required, he believes, and with this view all genito-urinary surgeons will unquestionably agree. It is interesting to note that Keyes makes use of the complement test of Schwartz and O'Neil, although he recognizes its limitations.

Quinine Irrigations for Gonorrhea. Albert Mowry¹ has recently called attention to the use of bisulphate of quinine irrigations in the treatment

¹ Illinois Medical Journal, August, 1911.

of acute and subacute gonorrheal urethritis. Of 14 patients treated by this method, he states that 50 per cent. were apparently cured at the end of two weeks, a result which is better than he has obtained with any other method. The strength of the solution first used is 1 to 3000, which is gradually increased to 1 to 1500. It is used as warm as the patient can endure without discomfort. In 4 cases of chronic posterior urethritis, instillations of a 1 to 400 solution were employed with fair results, and as an injection to be used by the patient himself, a solution varying from 1 to 1000 to 1 to 200 has been employed. The bisulphate was used instead of the sulphate because it is readily soluble in water. It may be of interest to mention the fact that a solution of quinine sulphate has been used for many years as an injection in gonorrhea by Dr. C. D. S. Fröh, of Philadelphia, who states that it has always given him excellent results.

The Aspiration Treatment of Gonorrhea. Last year the treatment of chronic urethritis by the method of aspiration used by Bronner and by Doré and Devignes was described. Another surgeon who has employed a method somewhat similar to that used by the above-named surgeons is Cariani,¹ of Genoa. He uses a series of different instruments adapted to the various parts of the urethra. The vacuum is produced by means of a Bier's syringe connected to an outlet on the distal end of the sounds. The aspiration is continued for about ten minutes, after which an irrigation of warm permanganate solution is given. The author believes that the mechanical effect of aspiration is superior to that of dilatation, even when the latter is combined with massage, inasmuch as he is convinced that the urethral glands are more thoroughly emptied of their diseased contents. In all his cases, which had been unsuccessfully treated by more usual methods, cure was obtained in a short time, the number of treatments given varying with the site and number of the urethral lesions.

Urethral Pruritus. Geza Greenberg,² of New York, recommends in addition to treatment directed for removal of the underlying cause of this condition the application of an ointment composed of:

Ichthyol	4.00 grams
Resorcin	0.65 gram
Quinine hydrochloride	2.00 grams
Vaseline	60.00 grams

This is smeared upon a sound and introduced into the urethra. He has found that the most common cause is urethral polypi, which are commonly situated 3 cm. behind the external meatus. Strictures may also cause it, as well as patches of chronic inflammation and the irritating action of urine-containing acid, particularly diacetic,

¹ Ann. des Mal. des Org. Gen.-Urin., September 2, 1911.

² New York Medical Journal, February 17, 1912.

oxybutyric, and acetone, and also oxalates, phosphates, sugar, etc. Among general causes he enumerates rheumatism, gastro-intestinal affections, alcoholism, masturbation, and especially neurasthenia.

When dependent upon polypi or chronic inflammatory conditions, there is sometimes a slight viscid urethral discharge. Sometimes this condition is associated with pruritus ani, especially if there be prostatic trouble which gives rise to the itching in the urethra. Of course the ointment above recommended is used only for relief, the fundamental treatment being directed toward the removal of the cause. Polypi should be removed, strictures dilated, and granulations destroyed. Diathetic conditions demand constitutional treatment.

Polypous Urethritis. At the meeting of the French Urological Association held in October, 1911, two interesting communications were made on polypous urethritis. Le Fur¹ considers this to be one of the most stubborn forms of urethritis with which the surgeon has to do. Ordinarily it is not diagnosticated, and consequently is not properly treated. Correct diagnosis is to be made only by means of the urethroscope, which reveals the nature of the trouble at once. Vegetations are most frequently found near the meatus and at the bulb, being rare in the prostatic urethra. They are best treated by cauterization done under guidance of the eye through the urethroscope. Applications of nitrate of silver or sulphate of copper may be made, or the growth may be touched with the galvanic cautery, which the author considers preferable. These treatments will have to be repeated many times. The patient should also be treated by high dilatation of the urethra. The authors succeeded in curing 3 cases of this affection in the manner described. Payenneville² also quoted a case of a patient whose anterior urethra was almost covered by confluent vegetations of this kind. The patient had been treated without result for chronic urethritis and chronic prostatitis. The diagnosis was only made after urethroscopic examination. After six weeks' cauterization with 20 per cent. nitrate of silver solution, and also with occasional applications of the galvano-cautery, the discharge had almost entirely disappeared and there were only a very few small isolated vegetations present. The author recommends that the vegetations be touched with nitrate of silver solution before the actual cautery is applied, as they are better marked out if this is done.

The Differentiation of Urethral Shreds. A simple though ingenious method of determining whether shreds come from the anterior or posterior urethra has been described by Maurice Wolff,³ of Chicago, who states that it was used by him and Dr. Blum, one of the assistants in von Frisch's Clinic in Vienna. It consists in having the patient

¹ Ann. des Mal. des Org. Gen.-Urin., November, 1911, No. 1.

² Ibid.

³ Northwestern University Bulletin, vol. xiii, No. 2.

inject into his urethra 1 c.c. of 0.5 per cent. solution of basic fuchsin in distilled water and retain it from one-half to one minute. The urethra is massaged externally while the fluid is retained, and then the patient lets it out on a piece of cotton, after which he urinates into two glasses.

It has been found that all of the shreds from the anterior urethra will be stained a deep red. If only such are present then it is obvious that the source of the trouble is in the anterior urethra, whereas if nothing but white shreds are present, the lesions may be attributed to the posterior urethra. If both white and red shreds are present, then there is trouble in both parts of the canal. The author believes that this method overcomes the fallibility of the two-glass test.

Methylene blue, zinc permanganate, and other coloring stuffs were tried, but were given up for the fuchsin stain.

Reconstruction of the Urethra. Last year the use of segments of veins for reconstructing the urethra was described. Recently a very critical study of the method has been made by Le Riche,¹ of Lyons, who used the method in 3 cases on the human subject. Although formerly in favor of this method, his own experience, as well as a study of the results obtained by others, shows that the method has not given a single permanent successful result when applied to the human subject. He concludes that this is an operation which should never be undertaken.

Mühsam² has reported a case in which the result seemed to be satisfactory at the end of three months. It was a case of a man, aged forty-seven years, who was first admitted to the hospital in June, 1911, suffering with infiltration of urine. Catheterization was impossible, so incisions above the symphysis and in the perineum were made, and the urine allowed to drain through both channels. The patient returned again in September suffering from a retention of thirty-six hours' duration. Under spinal anesthesia the bladder was opened, and retrograde catheterization undertaken. This, however, was not successful, and so the author proceeded to resect 6 cm. of the strictured urethra. After it was found that the catheter could be passed through the urethra both from the external meatus to the bladder, and *vice versa*, a piece of the right saphenous vein 8 cm. long was implanted to fill in the defect caused by the removal of the strictured portion. At the end of November the patient was dilated a few times. At the time the case was reported he was able to void through the natural channels.

Urethritis Due to the Micrococcus Catarrhalis. A very interesting communication on this subject has been made by Winfield Ayres,³ of New York, who calls attention to the fact, not generally known except

¹ Lyon Chir., December 1, 1911, vol. vi, No. 6.

² Zentralbl. f. Chir., 1912, No. 9.

³ American Journal of Surgery, March, 1912.

by bacteriologists, that the *Micrococcus catarrhalis* and the meningococcus both resemble the gonococcus morphologically and are both negative to Gram's stain. As the meningococcus has not been demonstrated in the urethra, only the former microorganism is considered. The author calls attention to those peculiar cases of urethritis which, though differing both in the intensity of subjective and objective symptoms, nevertheless show a Gram negative diplococcus in the discharge. These are the cases in which the patients have no swelling nor eversion of the lips of the meatus, in which the discharge is scanty, and in which there is very little pain upon urination. The author believes that many such cases of supposed gonorrhea are in reality a simple urethritis due to infection with the *Micrococcus catarrhalis*, and although a positive differential diagnosis can be made only by culture methods, he thinks the clinical picture is sufficiently plain to arouse suspicion of the nature of the trouble. With reference to the microscopic picture, it may be stated that a typical smear contains a large number of Gram negative diplococci in colonies independent of the pus cells, and that the pus cells are not filled with the microorganisms as they are in true gonorrheal urethritis. Such a microscopic finding, he believes, is in all probability indicative of *Micrococcus catarrhalis* infection. However, a microscopic examination alone is not to be depended upon, especially as the gonococci are rather extracellular than intracellular in the earliest stage of gonorrhea, and for this reason the culture method is the only positive means of differential diagnosis.

If a case has to be considered from the medicolegal standpoint, a microscopic examination of the growth upon agar should be invariably made, for the purpose of determining positively whether the organisms grown show microscopic characteristics corresponding to their gross characteristics; for instance, changes from Gram-negative to Gram-positive. Sometimes a culture of an old gonorrhea will show a growth similar to that of *Micrococcus catarrhalis*, but when it is stained and examined under the microscope it will prove to be a Gram-positive diplococcus or perhaps some form of bacillus. The mode of infection with this microorganism is obscure. From the history of some of his cases, Ayres thinks that infection may be communicated directly by intercourse. In other of his cases, however, too much time had elapsed since the patient had had intercourse for the infection to have been contracted in that way. The author has found that this infection tends to complete spontaneous recovery.

With reference to treatment he states that the balsamics are of value, but that an active local treatment increases the inflammation. This is especially true of the new silver salts in the strength employed for gonorrhea. If the discharge lasts longer than a week, then some local treatment should be given. Of the various preparations which he has used, he finds nitrate of silver, 1 to 32,000, better than all others.

This is a valuable contribution to the subject of urethral infection, and one which should lead genito-urinary surgeons in general to make further investigations of those anomalously mild cases of urethritis in which the bacteriological report comes back as positive to the gonococcus. During the last four months I have had 2 cases of this kind, both in males, which I think may probably have been due to the micro-organism discussed by Dr. Ayers. Another case which puzzled me at the time was that of a colleague, who developed a slight urethral discharge about a week after intercourse, and in which a competent bacteriologist stated he found the gonococcus. At the end of a week's treatment with balsamics internally and very weak injections of warm permanganate twice a day, there was not a vestige of discharge nor any filaments in the urine. I questioned the bacteriological finding at the time, but the laboratory man stated positively that he had found a Gram-negative diplococcus which corresponded in every respect to a typical gonococcus. After having been told the course which the case pursued, he suggested the possibility of a meningococcus infection, but stated that he had never heard of such a thing in the urethra.

MISCELLANEOUS AFFECTIONS

The Treatment of Nocturnal Enuresis in Children. In an interesting communication upon this subject, Ruhräh,¹ of Baltimore, emphasizes the fact commonly overlooked, that the condition is merely an expression of a variety of underlying causes, the exact nature of which should be sought in each individual case. That a considerable number of such cases are dependent upon the hyperesthetic condition of the nervous system or poorly developed spinal cords, the author is convinced. In such children minute lesions which would not affect the nervous system of a normal child, are sufficient to set up reflex irritability which results in spontaneous emptying of the bladder. He calls attention to Merklen's paper published about three years ago, in which reference is made to insufficient muscular tonicity as a cause, and also cites Freund's paper, published a number of years ago, in which attention was called to a coexistent hypertonia of the muscles of the legs in many of these cases. After discussing the well-recognized gross lesions which are often causative, such as phimosis, vulvitis, balanitis, fissure of the rectum, etc., he passes to a consideration of the treatment. In reference to the use of thyroid extract, recommended by Williams, he states that in a small proportion of the cases in which he has used it, the results were remarkable. These were all cases in children who either had or had had adenoids and enlarged tonsils.

¹ American Journal of the Medical Sciences, February, 1912.

When any improvement followed the administration of this drug, it began to manifest itself almost as soon as the drug was taken, in some cases being noticed after the administration of single dose and in all cases within a week. It was observed, too, that the under-sized children gained weight rapidly under this treatment. It was not found necessary to continue the medication over long periods of time. Evidently the author has not had personal experience with the epidural injections of salt solution, as recommended by certain French genito-urinary surgeons, although he states that it might be tried in refractory cases. It is interesting to note that the author has obtained better results in a greater number of cases with atropine than with any other drug or method which he has employed. He gives it in full dose, using a solution, each drop of which represents one-thousandth of a grain. Beginning with one or two drops, the dose is increased one drop at a time until flushing of the face occurs about twenty minutes after its administration. The dose is then diminished one drop, and this quantity continued until the child has ceased urinating at night, and for at least two weeks thereafter, when it may be discontinued gradually, the dose being diminished a drop at a time until it is reduced to one drop, when it may be stopped. If a child urinates during the night, one dose is given about five o'clock in the afternoon, the other at bedtime. For diurnal cases he recommends its administration every three hours during the day.

Styptol for Pollutions. Piersig,¹ of Berlin, has used styptol in a number of cases, and although he states that he has not yet had sufficient experience to enable him to make any general statement with reference to it, its action has been so remarkable in some of his cases that he considers it always worthy of trial. One patient, a young man, aged eighteen years, had suffered for months with pollutions, having had at least one and sometimes even three every night. His general health was somewhat affected. Marked improvement was evident after the use of two tubes of styptol. The after-treatment consisted in the use of an opium and belladonna suppository every second night. The patient was in good condition at the end of five months. He would have a pollution about once in two weeks.

Another case was that of a married man, who despite usual relations with his wife, would have a pollution every second or third night. This condition was entirely relieved after he had taken three tubes of styptol. Other cases of the same kind are reported. The author conceived the idea of using this drug because of the analogy existing between the verumontanum and the uterus. It had rendered him such good service in contracting the uterus that he thought he would try it to see if it might not have a similar action upon the vessels of the verumontanum.

¹ Zeitschrift f. Urologie, Band v, Heft 11.

Keratosi Blennorrhagica. A case of this rare complication of gonorrhea, first described by Vidal in 1893, has been reported by Frank E. Simpson,¹ of Chicago. The author has made a complete review of the literature. He gives abstracts of 20 recorded cases. His own case is the first which has been reported in America. It was that of a man, aged twenty-eight years, who contracted a specific urethritis in 1908. During the course of his infection he developed a multiple arthritis. About six months from the appearance of joint complications a generalized rash came out, being most abundant on the anterior surface of the legs, the forehead, hands, and fingers. At the time he came under Simpson's observation, in January, 1910, he presented an eruption



FIG. 20

which consisted of two general types, the greater part being made up of crust-like lesions of various sizes. The smallest, and evidently the earliest efflorescences, were 3 or 4 mm. in diameter, round or irregular in shape, sharply circumscribed, slightly elevated, and yellow in color. There was no inflammatory base to the lesions. The largest lesions looked much like rupial syphilides, although they had no inflammatory base. The color of these larger ones was brownish or grayish. The second type of eruption consisted of convex pustules having hard, horny summits, which somewhat resembled in appearance and consistence the pustules of smallpox. This eruption was situated about

¹ Journal of the American Medical Association, August 24, 1912.

the wrists and ankles and on the soles of the feet. The epidermis on the palms of the hands had become so thickened that it seemed like an artificial covering. On the trunk there were more than a dozen scattered patches of a crust-like type about 1 cm. in diameter. No lesions could be found on mucous membranes. The only symptom present was a slight itching, and that was by no means constant. The general condition of the patient, however, was very poor. He could hardly move because of ankylosis of the joints, which were greatly swollen and very painful. Cultures of the blood and of the fluid aspirated from the joints were negative to the gonococcus. In May, 1911, iritis developed in the right eye, and in July of the same year the patient became blind. In September, 1911, he committed suicide. At the time of his death the skin condition had become very much better, having yielded to persistent use of a sulphur and resorcin ointment. Autopsy revealed morbid changes in almost every organ examined.

In all but 2 of the reported cases of this condition, gonorrheal arthritis has been present, so that it would seem that there is a constant relation between the two. The author believes that the gonococcus invades the skin and that it is the direct cause of the lesions which develop there. Chauffard and Fiessinger were able to produce such an eruption in a keratotic subject by abrading the epidermis and then rubbing in the serum obtained from beneath one of the crusts. The same experiment, however, proved unsuccessful in a healthy subject and also in animals.

The Complement Fixation Test in Gonorrhea. Swinburne,¹ of New York, and Schmidt, of Chicago, have reported on the complement fixation test in gonorrhea which was brought to the attention of the profession by Schwarz and McNeil last year. Swinburne found that the reaction was usually negative in cases of long duration and also in the early stage of primary infections. Among the latter class of cases the reaction was first obtained when the disease had existed two weeks. He is not convinced that a positive reaction indicates the existence of a focus of living gonococci. It is possible, he believes, that the antibodies do not disappear from the system for some time after the disease is cured. As a method of differential diagnosis he considers the test most valuable, and cites cases in which it has rendered him great service in this respect. Schmidt also believes that if the test can be perfected it will aid in the solution of many puzzling questions relating to gonorrhea and its treatment. He states that if the reaction were found negative at a time when the patient is apparently cured and about to be discharged, it would give one greater assurance of cure than it is often possible to feel at present, even after all known methods have been resorted to. He has used this test in 77 cases,

¹ Transactions of the American Urological Association, 1911, vol. v.

including those of acute and chronic gonorrhea, epididymitis and arthritis, and also in patients who give a gonorrheal history and in those who deny it.

The gonorrheal complement fixation test has also been employed extensively by Gradwohl,¹ of St. Louis, who confirms the findings made by other investigators. He considers it to be of the greatest value in those cases which he terms "occult gonorrhea," and believes that when the exact nature of an organism can not be determined, a positive serum reaction would lead one to consider the organisms specific.

He considers the test to be especially valuable in the female, in whom the demonstration of the gonococcus is sometimes exceedingly difficult. In dealing with pelvic infections, the surgeon may derive help from this test, inasmuch as it may enable him to differentiate between those due to gonorrhea and those depending upon other causes. If the test works out true in such cases, it certainly will prove of great value. It is interesting to note that neither Gradwohl himself nor any one else as far as he is able to learn, has obtained this reaction in cases of posterior urethritis before the lapse of three weeks. With reference to the purely technical aspect of the matter, the author lays stress upon the necessity of having the test performed by an expert laboratory man, and although he does not consider it to be as difficult nor to have as many limitations as the Wassermann test in syphilis, this attitude which he assumes can certainly be approved of by all those who have been so unfortunate as to entrust complex laboratory methods to mere tyros in such work.

The Position of Vaccine Therapy in Urology. This subject was discussed by Reiter,² of Berlin, at the last meeting of the German Urological Society. His conclusions are as follows. Vaccine therapy cannot be practised exclusively in diseases of the genito-urinary organs, although when combined with other appropriate therapeutic measures it results in a considerable shortening of the course of the disease in more than 60 per cent. of all cases, and therefore should be employed in all localized infections such as those due to the gonococcus, and to staphylococcus and colon bacillus infections of the bladder and upper urinary organs. Occasionally, when rightly employed, it may delay surgical intervention or even make the same unnecessary. In many cases the injection of vaccine will prove valuable from a diagnostic standpoint. The best results are obtained with autogenous vaccines, which are considered absolutely essential to success in treating colon bacillus infections. In other cases, however, especially if the preparation of an autogenous vaccine is attended with great difficulty, for example, such as gonorrheal arthritis, epididymitis, etc., or if an injection is urgently demanded the use of polyvalent vaccines may be resorted

¹ American Journal of Dermatology and Genito-Urinary Diseases, June, 1912.

² Folia Urologica, November, 1911.

to. Small doses should be used at first. Then if the local reaction is not too pronounced the dose may be gradually increased. Whenever the stage of the infection or action of the injection is obscure, the opsonic index should be taken. The doses should be so regulated that a negative phase shall not last longer than twenty-four hours. If it lasts longer than this, the dose given is too large. When the action of a dose of vaccine appears to be too slight, a larger one is necessary. The larger the dose given, the longer the intervals between their use must be. As a rule, the injection should not be repeated under five days. In the discussion which followed Reiter's paper, Frank stated that he had often obtained good results with vaccines, especially in colon bacillus infection. Reiter also has seen improvement in the general condition of patients thus treated by colon bacillus infection, although the microorganisms remained in the urine. He thinks that irrigation of the pelvis of the kidney should be combined with this form of treatment. Casper stated that he had never observed any effect whatever in cases in which vaccines were employed in chronic pyelitis. In closing, Reiter laid special stress upon the method of preparing the vaccines, and advised that the bacteria be killed by 0.5 per cent. carbolic acid instead of by heat.

Williams, Murray, and Wallace¹ have found colon bacilli of different characteristics in the urine. Only once out of 9 cases were they able to isolate a microorganism which fulfilled in every way the characteristics of the true colon bacillus. In the other cases, microorganisms merely resembled colon bacillus. With reference to vaccine treatment they found that acute infections were always benefited by the administration of an autogenous vaccine, although the microorganisms did not always disappear from the urine. Cases of pyelonephritis in pregnancy were the most rebellious. In acute cases, the authors recommend doses of from 5,000,000 to 10,000,000 bacteria given at short intervals, and in chronic cases doses of from 50,000,000 to 300,000,000 administered at longer intervals.

Leonard Mackey,² who used vaccines in 39 cases, the majority of which were chronic, considers them to constitute the best form of treatment, although he recommends lavage of the renal pelvis in addition.

The Relation of Phimosis to Diseases of the Kidney. Heinrichsdorff,³ of Breslau, has seen 4 cases of phimosis accompanied by double hydro-nephrosis which eventually resulted in renal insufficiency and death. They occurred in boys of eight, ten, eleven, and fifteen years of age respectively, and are reported in detail. Concerning the pathogenesis

¹ London Lancet, April 20, 1912.

² British Medical Journal, May 4, 1912.

³ Mitteilungen aus den Grenzgebieten der Medizin und Chirurgie, 1912, vol. xiv, No. 3, fasc. 3.

of the kidney lesions, the author believes that balanoposthitis, which so frequently accompanies phimosis even of moderate degree, produces an additional obstacle to the free passage of the urine.

While the effect of phimosis on the bladder is well known, the resulting involvement of the kidney must be exceptionally rare. As a matter of fact, the author could find only 6 cases reported in literature.

This complication, though extremely rare, constitutes an additional reason for advising circumcision in all cases of tight foreskin, as done in last year's review when commenting upon the method of stretching the prepuce with forceps.

Essential Hemospermia. C. W. Schropshire,¹ of Birmingham, Alabama, has reported 2 cases of essential hemospermia, both of which he believes were due to the practice of interrupted intercourse. Neither patient had ever had any venereal infection, but both had enlargement of the seminal vesicles, and the secretion obtained by massaging them was stained with blood. Microscopic examination of this secretion did not show any pus cells. The treatment consisted in massaging the vesicles while the bladder was full of boric acid solution, and then giving an intravesical irrigation of the same solution after the patient had voided the solution previously injected. Vibratory massage was employed first and was followed afterward by digital massage. The author reviews the various theories which have been advanced to explain the occurrence of this condition, but he could not make any of them apply to his own case. Consequently he believes that the interruption of intercourse which the patients both practised was alone responsible for the congested condition of the vesicles. One of the patients suffered from a train of nervous symptoms in addition to the discharge of blood-stained semen. The former were more pronounced directly after intercourse, which he invariably did not complete.

Torsion of the Testicle. Various theories have been offered in explanation of cases of torsion of the testicle, but none of them have been considered conclusive. After making a careful study of these various theories, R. W. Murray,² of Liverpool, suggests that the condition is always congenital and never acquired; that is to say, that there has been some degree of torsion since birth. He states that in nearly every recorded case there has been both imperfect development and imperfect descent of the organ, and that the separation of the testicle itself from the epididymis by a long mesorchium has been invariably present. Such a condition would undoubtedly favor torsion during the passage of the testicle from the abdomen to the scrotum. In explanation of those cases in which torsion of a retained inguinal testis has developed suddenly after an injury or a strain, he believes that the traumatism produced venous engorgement in the organ, which

¹ American Journal of Dermatology and Genito-Urinary Diseases, June, 1912.

² British Medical Journal, July 6, 1912.

had already been twisted somewhat since birth, and that the symptoms are due to the former condition rather than to the latter, or perhaps to thrombosis of the bloodvessels of the cord which follow the injury. Naturally, the blood supply of the testicle would be less than normal if congenital twisting in any degree whatever were present.

Murray found that in approximately 70 per cent. of the cases which he studied the symptoms developed about the age of twenty, and that in nearly 50 per cent. of these cases they came on at puberty. The preponderance of cases at that period of life he thinks may be due to the sudden vascular changes which take place at that time and which might readily result in excessive congestion and thrombosis. This view seems to be strengthened by the circumstance that in a certain number of cases the trouble came on while the patients were asleep.

Relation of the Lymphatics of the Scrotum to the Removal of Scrotal Epithelioma. J. Marley,¹ of Manchester, England, has studied the lymphatics of the scrotum by the injection method, and has found that there is a very abundant though fine plexus of vessels between the skin and the dartos. This plexus establishes a very free communication between the two halves of the sac. Moreover, it communicates with the neighboring lymphatic plexuses, the anastomoses being very abundant with the plexus of the penis, but slight with those of the perineum and the thigh.

From this plexus a number of trunks are formed, which, traversing the dartos and entering the subcutaneous cellular tissue, empty into the inguinal lymph nodes. There are ten or fifteen of these channels on either side; the anterior ones ascend along the raphe in front and pass upward along the lateral surface of the penis to empty into the superior and external set of nodes; the median ones go directly into the inner nodes. The posterior ones pass upward behind, close to the raphe, and before reaching the perineum cross the posterior surface of the cord and finally pass over to the inner aspect of the thigh and empty into the inferior ganglia.

There are no channels which accompany the perineal vessels and the internal pudic into the pelvis. The efferent channels of the ganglia empty into other superficial nodes or into the inguinal nodes. Some of them which accompany the femoral vessels extend as far as the external iliac nodes before emptying themselves. The author never found a trunk which went directly to the intrapelvic nodes without sending branches to the inguinal glands. Moreover, he was unable to find any anastomoses between the superficial plexus and the lymphatics of the tunica vaginalis and the testicle.

As the result of his studies, he is of the opinion that in any case of epithelioma approaching the median line the lymph nodes on both

¹ Lancet, December 2, 1911.

sides should be removed. It is particularly necessary to remove the more external ones of the set, for it is exactly into those nodes that the lymphatic vessels nearest the midline empty. Scarpa's triangle should be completely cleaned out, 7 or 8 cm. of the saphenous vein resected, and the sheath of the femoral taken away. He does not consider it necessary to remove in their entirety all the lymphatic vessels between the lesion and the nodes. It is evident that he accepts Mr. Handley's theory of direct permeation through the vessels of the superficial plexus. Of course, such a resection would mean the removal of a large area of skin, so that a secondary plastic operation would become necessary, especially if the root of the penis were denuded.

SHOCK, ANESTHESIA, INFECTIONS, SURGERY OF THE EXTREMITIES, FRACTURES AND DISLOCATIONS, AND TUMORS

By JOSEPH C. BLOODGOOD, M.D.

GENERAL EFFECT OF INJURIES

Shock. In the previous numbers of *PROGRESSIVE MEDICINE*, in the critical review of the literature and of my own experience, I have emphasized the importance, in relation to surgery, of this condition that we call shock.

Crile and Dolley were the first to demonstrate an anatomical basis for shock. This has been discussed here.¹ I can find nothing further in the literature on this subject.

It seems to be the growing sentiment among surgeons that in the future more attention must be devoted to the general condition of the patient. We have perfected a technique which practically eliminates the danger of infection of the wound during operation. For most surgical conditions, the mechanical part of the technique is pretty well settled, but the operation produces some shock in all cases, in many considerable shock, and in a few it is the cause of death. We now know some of the factors of shock—the trauma of the operation (traumatic shock), the loss of blood (hemorrhagic shock), fear and anxiety (psychic shock), the anesthetic (toxic shock), and, in some cases, the disease itself previous to operation has been the cause of shock. The factors of disease may be the same as of the operation. In accidental injuries we have the traumatic, hemorrhagic, and psychic factors; in burns, the toxic factor from the absorption of the burned, necrotic tissue. In disease, pain and discomfort act in the same manner as trauma in injury or operation. In some diseases there has been anemia from hemorrhage, in most there has been fear and anxiety, and this is increased when operation is suggested. In many diseases there is, in addition, a toxic factor. This is extreme in such lesions as exophthalmic goitre, intestinal obstruction, acute hemorrhagic pancreatitis, general infection, diabetes, alcoholism, jaundice, impaired renal function, acidosis from starvation, etc.

¹ *PROGRESSIVE MEDICINE*, December, 1910, p. 165; *Annals of Surgery*, 1910, li, 753.

In an investigation of the mortality of operative intervention, one becomes much impressed with the element of shock as a factor, and, in some cases, the chief cause of death.

Surgeons too frequently concentrate their attention before, during, and after operation on the local lesion and do not pay enough attention to the general condition of the patient.

From an experimental standpoint there is yet much to be done in the investigation of the pathology of shock and of its physiology. In practical surgery we can today utilize the experimental and clinical knowledge already established and accessible in the literature. We must constantly bear in mind the general condition of the patient.

Alexius McGlannan¹ gives a very good summary of the experimental and clinical literature on shock, and I wish to again refer here to the comprehensive contribution of Meltzer² on the nature of shock which I have previously reviewed.³

OPERATIVE SHOCK. Crile⁴ presented, before the Surgical Section of the American Medical Association, a résumé of his experimental and clinical experience which has resulted in a definite technique of operation designed to prevent or reduce shock to a minimum on the principle of what he calls "anoci-association."

Crile is of the opinion that the two great factors in shock which are the most difficult to control are anesthesia and the trauma of operation. He takes it for granted that today the hemorrhagic factor is so well understood that every surgeon will operate with a minimum loss of blood. Crile's experience brings him to the conclusion that nitrous oxide and oxygen, properly given, is the anesthetic of choice, with, in some cases, the addition of a few drops of ether. Further discussion of this anesthetic will follow later. In operations cutting, tearing, traction, handling of sensitive tissues produce shock of various degrees. To reduce this, Crile infiltrates these tissues with a 1 to 400 solution of novocaine. In his operations he attempts in every way to perform the manipulations as gently as possible. This combination of general and local anesthesia is not new. I have discussed it in previous numbers of *PROGRESSIVE MEDICINE*, but Crile's views and technique are by no means universally accepted and followed. My experience confirms the conclusions of Crile.

To develop this technique, one should employ it in all cases. If it is used only for handicapped cases, no surgeon will sufficiently master it to get the best results. I agree with Crile that this technique will reduce mortality and operative complications, make recovery from surgical operations more comfortable, and shorten the period of disability.

¹ Maryland Medical Journal, February, 1912.

² Archives of Internal Medicine., 1908, i, 571.

³ *PROGRESSIVE MEDICINE*, December, 1908.

⁴ Journal of the American Medical Association, 1912, lix, 114

Gray and Parsons,¹ in a résumé on the mechanism and treatment of shock, show that every sensory nerve carries pressor and depressor fibers to the vasomotor centres. At first stimulation affects chiefly the pressor fibers, and gives rise to increased blood-pressure and acceleration of the heart. They call this the stage of stimulation, or the pressor stage. Later, due to the fatigue of the pressor fibers, the depressor fibers become involved, and now we have the second stage, or that of depression, which is the beginning of shock.

If one will carefully study the pulse and blood pressure before, during, and after operation, he will find that, in the individual of average health, excitement, the beginning of anesthesia, struggling, and all painful manipulations during the operation increase the blood pressure and accelerate the pulse. If this continues long enough, the same factors lower the blood pressure. I will discuss this again under blood pressure.

Operative shock of the grave degrees is, as a rule, recognized, often, however, at too late a period, when prevention is impossible and treatment less efficacious. Without careful blood-pressure estimation during operation, I am confident, the factors of shock, the onset of the condition will not be recognized.

The more carefully I investigate the subject, the more I am convinced that surgeons must, in the future, give more attention to the general condition of the patient before, during, and after operation.

TREATMENT OF SHOCK. Prevention, of course, is the best method of treatment, and I shall discuss this under heading of pre-operative treatment and investigation. Nevertheless, we shall frequently be called upon to treat shock after injuries, during and after operations, and toxic shock from disease. When shock takes place during operation, the anesthetic should be removed and the operation interrupted at once, if possible. Lilienthal² discusses the principle of the two-staged operation. It is better, if possible, after investigation, to deliberately plan the operation in two stages.

In general, the treatment of shock may be summarized as follows: Cease the anesthesia; chloroform always, ether generally. When the operation is being performed under these anesthetics, change to nitrous oxide and oxygen, if possible. When the operation is performed under the latter anesthetic, the narcosis may be continued, if necessary, but prepare for the drop in blood pressure which always takes place after this gas is turned off. That is, do not lift the patient from the table until all other measures for combating shock have been employed and the blood pressure shows that the patient has reacted sufficiently for transportation without danger. Cease, if possible, all painful manipulations. Use novocaine locally to block all sensory impulses, if possible.

¹ British Medical Journal, April 27, 1912; review in Journal of American Medical Association, 1912, lviii, 1644.

² Annals of Surgery, 1910, li, 30.

Other measures are: Elevation of the foot of the table; salt solution per rectum, subcutaneously or intravenously; direct blood transfusion, if there has been loss of blood; external heat, if the patient is cold; ice to the head in hot weather, or when the patient has temperature; in some cases, especially exophthalmic goitre, ice to the heart; in extreme cases bandaging the limbs, or the pneumatic tourniquet; morphine when the patient is restless or suffering pain. I know of no cardiac stimulants of any value, except strophanthin, which will be discussed later. In sudden collapse of the heart, massage of this organ may be attempted. In respiratory failure, Meltzer's new method of intratracheal or intrapharyngeal insufflation may become a life-saving measure.

Salt Solution. This subject has been fully discussed in previous numbers of PROGRESSIVE MEDICINE. When shock has been anticipated and is recognized early, it is sufficient to give the solution per rectum and subcutaneously, in extreme cases intravenously. One should always be careful not to overdo this. It should always be given slowly, watching the effect on the blood pressure.

Adrenalin. We know that adrenalin solutions temporarily increase the blood pressure. Crile, and others, have studied it experimentally and used it clinically in shock from various causes. I have had no practical experience with it, except on a few occasions. I object to its use on account of its effect upon the kidney. Anuria often follows shock. Adrenalin undoubtedly has a bad effect upon kidney function in certain cases. It is for this reason that I hesitate to employ it. Koll¹ experimented on animals and found that with a continuous intravenous infusion of an adrenalin-salt solution he could maintain a uniform rise in blood pressure for three hours in dogs, and he is of the opinion that this will have practical application in surgery. He, however, states that there should be further experimentation to get at the proper dose and contraindications. M. Neu² has employed it to maintain blood pressure in the toxic shock of peritonitis, but as he got good results chiefly when enterostomy was also performed, it is fair to conclude from my experience with this condition, that the enterostomy may have been responsible for the result. I am, therefore, not prepared to recommend adrenalin in the treatment of shock.

Strophanthin. We do need a drug which will act rapidly in certain cases, one which will increase blood pressure and slow the action of the heart. It is indicated in certain cardiac cases before operation, during operation, and after operation, when there is a sudden fall in the blood pressure with rapid pulse. After reading the literature on strophanthin describing the results in the treatment of certain heart diseases by the internists, I concluded that it would be justifiable to try it in certain surgical emergencies. It is given into a vein with the

¹ Centralbl. f. Chir., 1911, xxxviii, 240.

² Ibid., 1911, p. 1001.

hypodermic needle, in a dose of 1 mg. (the drug comes in glass ampullæ containing the proper single dose), and the effect usually lasted twenty-four hours. My experience, so far, is limited. Dr. Calihan, the resident surgeon of St. Agnes' Hospital, is collecting the cases for publication. With few exceptions, when I employed it, it has raised, and, as a rule, maintained, the blood pressure 10 to 15 degrees. I have used it in a few cases of myocarditis preparatory to operation, and in a few cases during and after operation, when there has been a sudden fall in the blood pressure below 90. In some of these cases it seemed to be a life-saving factor. A. Fraenkel¹ reports his experience with this drug given intravenously in chronic heart disease with most favorable results, but I do not find any reference to its employment in surgical cases. The medical literature is large. There is no doubt that it increases blood pressure and slows the pulse. My experience is too limited to know whether there are dangers in this method. I have seen no bad effects. Hedinger,² in 1909, wrote that the treatment was well established, that is, the intravenous method, and that there are no complications if the solution is properly sterilized. The dose should never be larger than 1 mg. in twenty-four hours. There are then no cumulative effects. The method of administration is simple: Fill the hypodermic with the solution, constrict the arm to get dilatation of the veins below, select the largest vein, cleanse the skin, introduce the needle into the vein, inject the solution slowly, pull out the needle, compress the vein for a few minutes. I trust that this drug will be an addition to our treatment of shock.

Heart Massage. I have discussed the contributions of Conklin and Green³ and the transdiaphragmatic method of Depage in *PROGRESSIVE MEDICINE*, December, 1908, p. 133. In this latter instance the abdomen was opened for a laparotomy and the heart was grasped through the diaphragm. The effect was immediate, and the patient recovered. Fairchild,⁴ in a paper read before the Western Surgical and Gynecological Association, in 1906, had a similar successful case in which the heart was massaged through an accidental wound. He discusses 25 cases. It is interesting to note that in 18 cases the anesthetic was chloroform, in 2 there was no anesthetic, in 2 cases the anesthetic was ether, in 3 cases the anesthetic is not stated. This shows the danger of chloroform. In 3 of the 5 successful cases the abdomen was already open, and the heart was massaged as in the case reported by Depage. In a number of cases the heart was directly massaged through an incision in the pericardial sac with, or without, resection of the rib.

¹ Münch. med. Woch., February 13, 1912; review in Journal of American Medical Association, 1912, lviii, 904.

² Münch. med. Woch., 1909, liv, No. 41.

³ *PROGRESSIVE MEDICINE*, December, 1907, p. 138.

⁴ New York Medical Journal, September 2, 1905.

Frazier,¹ in reporting a case, reviews the extensive report of 46 cases by von Cackovic² and gives the following statistics: In 28 cases the heart was directly massaged through a thoracoplastic opening; there were 2 successes, 8 are classed as partially successful, and 18 as failures. When the transdiaphragmatic method was employed, which means a laparotomy and incision of the diaphragm, there were no successful cases; one is recorded as partially successful, and two cases as failures. However, when the subdiaphragmatic method was employed, as in the case reported by Depage, 8 were successful, 5 partially so, and 6 were failures. One should never wait longer than ten minutes—the best results were within five minutes.

Lenormant³ states, from an experience with 4 cases, that one may succeed in getting the heart to beat even after one hour, but this is of little avail, as the nerve cells have died and do not regain function. The heart massage should be begun within five minutes and never later than ten or fifteen.

A. T. Jurasz⁴ reports a successful case. He was resecting the stomach under chloroform-ether anesthesia; when pulling on the duodenal stump there was immediate collapse, with apparent cessation of heart action; the heart was grasped through the diaphragm, and slowly and rhythmically contracted; pulsation returned, the operation was finished, and the patient recovered.

I have had no experience with this complication. I have been unable to study every case critically. If surgeons discontinue the use of chloroform, except in a very few selected cases, this complication will rarely take place. If the newer methods of pre-operative investigation and anesthesia are employed, the patient is carefully watched, and blood pressure records are kept, I doubt whether this startling and distressing emergency will be observed, except on the rarest occasions. Nevertheless, when it does occur, the surgeon should act promptly. If the abdomen is open, we have a direct route to the heart; if not, a rapid laparotomy should be performed and the heart grasped through the diaphragm. When surgeons have acquired the technique of the Meltzer-Auer method of intratracheal or pharyngeal insufflation, the probabilities are that resuscitation will be easier and more frequently successful, and the direct exposure of the heart in its pericardial sac through the pericardium less dangerous from injury of the pleura with secondary pneumothorax.

Pre-operative Treatment. This subject grows larger each year. It includes the very broad questions of preventive surgery, the more careful and painstaking investigation of the patient's general condition,

¹ Journal of American Medical Association, 1911, lvi, 1448.

² Archiv f. klin. Chir., 1909, lxxxviii, 917.

³ Centralbl. f. Chir., 1910, xxxvii, 531.

⁴ Ibid., 1911, xxxviii, 550.

with the object of estimating, if possible, the vital resistance, and the more thorough and scientific preparation of the patient before operation, with the hope that this preparation will diminish its dangers.

Preventive Surgery. I thought until recently that I¹ was one of the first to write on this subject. My paper was delivered before the Lehigh Valley Medical Association in July, 1911. But recently I have read a very comprehensive paper on preventive surgery by G. Paul Laroque.² This paper was delivered in February, 1911—previous to mine.

Recently I have presented (June, 1912), before the New Jersey State Medical Association, a second communication on preventive and unnecessary surgery.

Preventive surgery is somewhat difficult to define. In its broader sense it overlaps preventive medicine and has the same objects—the education of the public and the stimulation of legislatures to devise certain laws and regulations which have for their object the removal of certain causes which lead to pathological lesions which can only be relieved by surgical intervention. In this sense much of the surgery or lesion due to trauma are preventable. The elimination, by proper means, of such infectious diseases as typhoid, tuberculosis, the exanthemas of children, and many others, will eliminate the surgical complications of these infections which form a large part of the operative work today. This is the broader field of preventive surgery. All large surgical clinics can produce the facts. They can call the attention of the public to these facts. It will then rest with the people to devise the means of prevention.

In a narrower sense, preventive surgery has for its object the elimination of surgical operations at a period when the mortality is greater, the probability of a permanent cure less, and the period of disability longer.

All large surgical clinics have these facts. The literature contains many articles demonstrating the unsatisfactory results of late interventions. Progress in this direction rests upon the education of the public to seek advice earlier, and the education of the medical profession to be better diagnosticians and to employ instruments of precision and laboratory methods more frequently to aid them in this diagnosis.

I recommend the reading of Laroque's communication. Space forbids a full discussion here.

Maurice H. Richardson,³ in his paper on the elimination of preventable disasters from surgery, delivered before the Medical Associa-

¹ Medical Aspects of Surgical Diseases, or Preventive Surgery, Journal of American Medical Association, 1912, lvii, 829.

² Old Dominion Journal, May, 1912, xiv, 285.

³ Journal of American Medical Association, 1912, lviii, 1473.

tion of the State of Alabama, discusses two points: The failure on the part of the people to seek advice in the early stage of the diseases when the minimum symptoms only are present, and the failure of the physician and surgeon to make an early diagnosis.

John M. T. Finney,¹ in his paper before the Medical Society of the State of New York, on the duty of the family physician in the management of surgical cases, emphasizes a very important point in preventable or unnecessary surgery. He writes that surgery should be restricted to the trained surgeon, and others should not attempt to operate. It requires a much more skilled surgeon to know what to do, and when to operate, and when not to operate in the early stage of the surgical lesion.

Much surgery can be prevented absolutely, if the surgeons will present the facts from their accumulated experience for the education of the public and for the direction of proper legislation.

Surgery of the later and often hopeless stage of a lesion will be prevented and made unnecessary if the people are instructed as to the earlier signs and symptoms, when the physicians become better diagnosticians, and when surgeons themselves acquire the additional training necessary for the successful treatment of lesions in their earlier and more obscure state. I will discuss this more in detail under the different lesions.

Preventive surgery, therefore, is the beginning of pre-operative treatment.

Immediate Pre-operative Treatment. In a symposium of the Section on Surgery of the Medical Society of the State of Pennsylvania, I² discussed the estimation of the vital resistance of the patient with reference to possible recovery after operation. This is a very practical every-day problem in which the physician and the surgeon investigate together. The first question to be answered is: Are the symptoms sufficient to indicate that an operation offers the best chance of a cure? Second, what is the patient's general condition?

All surgical lesions may be divided into acute and chronic. The acute cases are, to a certain extent, emergencies. Here the danger of immediate operation without any preparation is less than the danger of delay. Statistics of any large surgical clinic will demonstrate that in acute surgical emergencies there is a large mortality from delay. In some cases, the fatal result is influenced by a few hours; in others, by a few days. In many of the cases it is not the fault of the patient, but of the physician, or surgeon, or of both. This question needs no extensive discussion. In injuries with shock and hemorrhage, in extending local infections, in appendicitis, in perforations of the hollow viscera, in peritonitis from any cause, in intestinal obstruction, the chief danger to the

¹ Journal of American Medical Association, 1912, lviii, 1475.

² Annals of Surgery, May, 1912, p. 641.

life of the patient is delay. There is no time for any preparation. The operation must be performed at once.

In the chronic cases where there is no danger from reasonable delay, there is time for the most painstaking diagnosis and preparation. The dangers here arise from the necessary operation and the general condition of the patient.

It seems strange, but it is nevertheless true, that there is a large mortality today in operative surgery due to delay in acute cases and haste in chronic cases.

There is no doubt that in chronic cases a more careful investigation will, in a certain number of cases, prevent operation altogether. In others, it will lead to such preparation and to a method of anesthesia and operation which will give the individual patient the very best chance of recovery, immediate, and ultimate. In the last few years there have been a number of articles dealing with this subject in general. Stuart McGuire, of Richmond, in a paper read before the Rochester Surgical Club, Rochester, Minn., considers very carefully the influence of the general condition of the patient on the outcome of the operation. He takes the view I have just expressed. In emergency operation there is no time to be lost; in elective operations every possible means of diagnosis and methods of pre-operative treatment should be resorted to. He is of the opinion that no operation is devoid of some risk. He emphasizes the importance that the operation should be performed by an experienced surgeon. This is especially true in the chronic cases, or the elective operation, because there is ample time to transport the patient or to get the more experienced surgeon. He quotes Sir James Paget: "Never decide upon an operation, even of a trivial kind, without first examining the patient as to the risk of his life." McGuire emphasizes the point just made, that there should be two separate examinations: The first has for its object the determination as to whether the local condition is one for which an operation promises the best chance of a cure; the other investigates the general condition of the patient.

Willis,¹ of Seattle, Wash., writes that the surgeon in his enthusiasm is too often prone to forget pre-operative treatment; his vision rarely goes beyond the local lesion; he does not consider the great importance of the proper psychic effect of the suggested operation; he is apt to be abrupt. To him, an operation is a daily occurrence; to the individual, it is usually the first experience, and this individual has often heard of only the disasters of surgery.

Carr,² of Washington, concludes his paper as follows: It is necessary to pay stricter attention to the following things:

1. A careful study of our patients and a careful endeavor to get them into as nearly ideal condition as possible.

¹ Northwest Medicine, October, 1909.

² Surgery, Gynecology, and Obstetrics, 1911, xiii, 434, 463.

2. Avoidance of pre-operative shock.
3. Diminishing operative shock by (a) skilful anesthesia, (b) shortening the time of anesthesia and operation, (c) avoiding rough or prolonged handling of viscera and important nerves.
4. Rapid work will be greatly facilitated by knowing beforehand just what we are going to do and doing it, not hurriedly, but without hitch or delay. We should always see that sharp knives, scissors, and needles are ready, and all necessary instruments.
5. Leaving our wounds in ideal condition is of more importance than is generally believed.
6. Gloves should not be used in cases where clean, rapid work is of paramount importance.

I cannot agree with Carr with regard to gloves. I am quite certain that surgical experience today proves that, with very few exceptions, the operation can be done just as rapidly and just as well with gloves, as without them. Surgeons who do the greatest number of intestinal sutures wear gloves. Carrel, and others, in their experimental work on arterial suture and anastomosis do not wear gloves. In my somewhat limited experience in this branch of surgery I have found no inconvenience from gloves. I will discuss this point later.

I have found that the rapid operator desires and insists upon deep narcosis. I am confident that the additional time required when one works under nitrous oxide and oxygen, or light ether, is much less dangerous than the quicker operation under deep narcosis. With rapid work there is greater danger of rough handling of the tissues.

Pre-operative Diagnosis. LOCAL. This has to do with the lesion, the symptoms of which suggest that an operation offers the best chances of a cure. I have just discussed the division into acute, or emergency cases, and chronic in which there is no danger of a reasonable delay.

In the acute cases the mistakes in diagnosis have done harm by inducing delay. I am quite confident that in this group the danger of immediate operation is much less than the danger of delay. Primrose¹ presents the subject of the bad results of delayed and incomplete operations in a very clear and forcible way.

I prefer to discuss this question later under the various local lesions: Wounds, infections, tumors; lesions of special tissue, such as bones, joints, etc., and lesions of the lymphatic glands in the groin and axilla.

Diagnostic Errors. Surgeons are not prone to publish their errors in diagnosis; nevertheless, the accumulated experience of any one surgeon or clinic along this line would be helpful.

There is first, in cases subjected to operation, room for an investigation of the relation between the diagnosis before and after operation, and of the influence of errors here on the immediate and ultimate result. It is my opinion that in a surgical diagnosis accuracy as to

¹ Cleveland Medical Journal, March, 1911, x, 173.

the exact nature of the lesion is not so important for the patient as accuracy in judgment as to whether the operation should be performed immediately or not. In most cases the accurate diagnosis is made when the lesion is explored.

It is especially true of surgical lesions that the easier the clinical diagnosis, the worse the prognosis.

Kelley¹ reports on the surgical mistakes in infancy and childhood, and mentions first the danger of delayed operations; mistakes in estimating the vitality of the infant; mistakes in judgment as to the surgical procedure in infants. I have been carefully investigating the surgical diseases in children under fifteen, and am not prepared yet for publication, but so far in my investigation the chief factor in the unsuccessful results has been due to delay in the operation. This delay apparently has been brought about by the greater difficulties in making a diagnosis in younger children, and the fear of operative procedures on the young.

Richard C. Cabot² has made an investigation of mistakes in diagnosis by a careful comparison between the diagnosis before death and the findings at autopsy. It is a communication well worth reading, but I cannot properly review it here.

GENERAL. Every patient subjected to general anesthesia should be given the benefit of the following routine examinations: Temperature, pulse and respirations, blood pressure, blood examination, physical examination of the chest as to the condition of the heart and lungs; examination of the urine, estimation of kidney function, if possible; examination of the nasopharynx as to the presence or absence of nasal obstruction, enlarged tonsils, adenoids, sore throat; examination of the skin for the possible presence of skin lesions.

If there are any symptoms suggesting a brain lesion, the ophthalmoscope should be employed. This examination is often neglected.

In goitre and tumors of the throat, the vocal cords should be inspected with the laryngoscope.

The employment of instruments of precision and scientific laboratory methods of examination should never be neglected when indicated.

In jaundice cases and in patients giving a history of hemorrhage, the coagulation time of the blood should be tested. In lesions of bones and joints, one should always look for the signs of tabes or syringomyelia.

In all doubtful cases, a Wassermann test should be made. This is most frequently neglected. In the past six months 4 cases of ossifying periostitis have come under my observation with the diagnosis of periosteal sarcoma, and amputation had been urged without a blood test. The Wassermann was positive in these cases.

¹ Journal of American Medical Association, 1910, Iv, 839.

² Massachusetts General Hospital Publications, October, 1911, iii, 396.

I cannot enter into the discussion of this question further, but I am convinced that these general methods of pre-operative investigation are too frequently omitted.

Kidney Function. Since the original communication of Rowntree and Geraghty, in May, 1910, I have employed with increasing frequency the phenolsulphonephthalein test for renal function. At St. Agnes' Hospital it has almost become a routine procedure. The results will soon be published.

Cabot and Young¹ and Goodman and Kristeller² confirm the observations of Rowntree and Geraghty as to the value of this test.

Cardiac Function. Nothing is more difficult than to estimate the factor of safety in a crippled heart. The ordinary physical examinations which reveal the presence or absence of murmurs and give some idea as to the size of the heart are not particularly helpful in estimating its real strength, and whether it can stand the burden of the operative and anesthetic shock. On the whole, surgeons fear heart lesions less now than some five or six years ago. Myocarditis, with dilatation, and the so-called fatty heart withstand operation least. This condition is also more difficult to diagnosticate. The acute dilatation of the heart which may take place suddenly during operation and after operation is a very grave complication. Barker³ discusses the newer methods of precision in investigating cardiovascular states, and the principle of protection from, and treatment of cardiac failure.

Surgeons should familiarize themselves with literature of this kind.

Shock during Operation. I shall discuss this when I consider together nitrous oxide anesthesia and blood pressure.

Postoperative Complications. Space forbids a discussion of this subject. The better surgeons understand all the factors of shock, the more carefully the patient is prepared for operation, and the safer the anesthesia at operation, the less frequently will postoperative complications be observed.

Anesthesia and Blood Pressure. No one can dispute that the better the condition of the patient, the greater his resistance. This aspect of the problem, which I have called the medical aspect of surgical disease, or preventive surgery, I⁴ discussed before the Lehigh Valley Medical Association in July, 1911.

Today, in surgical operations, one of the chief factors in mortality, postoperative complications, and the longer period of disability, is shock.

At the recent meeting of the Surgical Section of the American Medical

¹ Boston Medical and Surgical Journal, October 12, 1911, clxv, 549.

² Surgery, Gynecology, and Obstetrics, January, 1911, p. 56.

³ Cleveland Medical Journal, April, 1911, x, 269; Virginia Medical Semi-Monthly, 1911, xv, 457.

⁴ Journal of American Medical Association, March 23, 1912, lviii, 829.

Association in Atlantic City, George W. Crile presented the evidence from his clinical experience which demonstrated that, with his technique of nitrous-oxide-and-oxygen anesthesia combined with the local infiltration of 1 to 400 novocaine, the shock during operation was either prevented or greatly diminished.

In the discussion of this paper I took the opportunity to state that we owe much to Dr. Crile for his experimental and clinical labors which have clearly elucidated the factors in shock and the methods by which these factors can be eliminated or reduced and, in addition, shown the best methods for the treatment of shock.

In PROGRESSIVE MEDICINE since 1899 I have presented, in the December number of each year, a critical review of the literature on shock and on anesthesia. I have also written a short chapter on shock for the *American Practice of Surgery*, edited by Bryant and Buck, vol. i, p. 463. In the review on surgery of the year which appears in the *International Clinics*,¹ I have again and again discussed the more approved methods of pre-operative treatment, of the recognition and treatment of postoperative complications, and on the problems of shock and anesthesia.

I make this statement to show that I have given considerable attention to the subjects of shock and anesthesia since 1899, and I have attempted to keep the most careful records of my own clinical cases. This has led to the employment of blood-pressure records before, during, and after operation in practically all cases during the last three years.

It is unfortunate, from the standpoint of comparative analysis, that I have no such records of previous years, because in the last three years I have employed nitrous oxide and oxygen for general anesthesia in the majority of cases, and for this reason I have not the same number of blood-pressure records with ether anesthesia.

ШОК. Before presenting the evidence which goes to show that the sphygmomanometer is our most important instrument for the estimation of shock, it will not be out of place to mention briefly the factors of shock.

Shock is a condition difficult to define. Crile is of the opinion that it has a distinct anatomical basis. His experimental work on animals tends to show that the chief effect of shock is seen in the protoplasm of the nerve cell, both cerebral and spinal.

Experiment and clinical observations show that this condition, called shock, is brought about by factors which apparently act upon these nerve cells. These factors are psychic, hemorrhagic, traumatic, and toxic. One factor seldom acts alone.

Every physician is familiar with the effect of fear and anxiety on

¹ 1905, vol. i, 15th series, p. 267; 1909, vol. i, 19th series, p. 270; 1910, vol. i, 20th series, p. 257.

the nervous condition of the patient. I have been able to take the blood pressure in 2 cases in which all the factors except fear could be eliminated. The blood pressure dropped from 140 to 80 in ten minutes, with all the symptoms of syncope, except loss of consciousness. This psychic factor is a very important one. It is often overlooked, or not sufficiently considered. It varies with the individual, with sex, age, race, and social condition. It begins the moment operation is suggested, and lasts varying periods after the operation. I cannot discuss here the prevention and treatment of this psychic factor. Briefly, everything should be done to allay fear and establish confidence.

Undoubtedly, the knowledge that operations have a minimum mortality, a comfortable convalescence, and are the only means by which a permanent cure of the disease can be accomplished, will in time diminish the fear of surgery and establish a confidence which undoubtedly will eliminate to a large extent this psychic factor. But this condition of affairs is by no means established today.

The hemorrhagic factor is well known. Surgeons today attempt, with more or less success, to operate without sufficient loss of blood to have any influence on shock.

In accident surgery, hemorrhage may be a very predominant factor, but today we can neutralize this by direct blood transfusion.

The traumatic factor is a much more difficult one to control. In accident surgery the trauma and its consequences have already taken place. From the moment that we see the injured patient all we can do is to attempt to prevent further sensory impulses of pain by the administration of morphine, and proper treatment of the wound.

During some operations the traumatic factor is slight, in others it is very great, but it is present in all. Many surgeons do not realize the significance of the operative trauma in the production of shock. *Only by the most careful observation, and in my opinion by the aid of the sphygmomanometer, will surgeons be able to estimate, prevent, and check this operative traumatic factor.* Every time the surgeon cuts or handles sensitive tissue the impression of this trauma is carried by a sensory nerve to the nerve cell, and in time the combined effect of these sensory impressions produces shock of different degrees. This lowers the vital resistance of the patient to the other factors of shock. It is an element in the mortality of operation, it produces a condition which increases the probability of postoperative complications, it adds to the discomforts of convalescence, and lengthens the period of disability. Crile more than any other has emphasized this factor, and developed a technique for its prevention or confinement within safe limits.

The toxic factor is well shown in patients suffering with infectious diseases or toxemia. The best examples are patients with exophthalmic goitre, and those suffering with intestinal obstruction. But laboratory investigation and clinical experience have shown that anesthetics and other drugs also act as toxic factors in the production of shock.

From the standpoint of the surgeon, there is no better anesthetic than chloroform—it is not difficult to administer, the patient takes it readily, the relaxation is ideal, but the dangers of chloroform are too great to allow its employment as an anesthetic, except in emergency, when no other is available, and in certain cases and selected operations. The indications for chloroform, however, are growing fewer and fewer as the knowledge of its dangers is becoming better defined and more generally understood. Chloroform is a profound depressant of the blood pressure, and patients anesthetized with this drug exhibit the symptoms of shock much more quickly. The dangers of chloroform are not only immediate, but there are late effects which may be fatal. Ether is distinctly less dangerous than chloroform, but it is undoubtedly toxic, and after the operation is completed, the patient has the additional burden of elimination of the drug. Ether is more difficult to administer than chloroform, and for many years the administration of ether was distinctly bad. The method of administering ether by drops on an open cone was a great advance in technique, and we needed no blood-pressure apparatus or exhaustive studies of comparative records to illustrate the difference between the two methods of its administration.

Having perfected the method of administering ether, further keen and critical observation began to show its dangers as a toxic substance. No matter how well ether was taken, and how well the patient behaved during the operation, our observations during and after operation illustrated that there was room for improvement. This undoubtedly led to the introduction of nitrous oxide and oxygen as the anesthetic of choice. This will be discussed later.

THE VALUE OF BLOOD-PRESSURE RECORDS. The majority of investigators employed the sphygmomanometer in their laboratory experiments for the study of shock, and most authorities today agree that low blood pressure as recorded by the instrument of precision is the best index to shock. There is some difference of opinion which need not be entered into here as to the relation of lowered blood pressure to shock.

Today it cannot be disputed that for practical purposes in the estimation of shock we have no available means equivalent to the sphygmomanometer. Yet it is not generally employed by surgeons before, during, and after operation.

I am so confident of its practical aid that I now use it as a routine in all operations. In this paper I can give only a sketch of these observations, because all of the records have not been systematically classified and prepared for publication. However, I embrace this opportunity to make a preliminary report of the study which I had begun for a paper to be presented in October before an Association of Railroad Surgeons in Duluth.

To reap the full benefit of the blood-pressure estimation it must be

employed in all cases. Only in this way will the surgeon become familiar with the factors which produce shock before, during, and after operation.

The same is true of any technique which has for its object the prevention of shock and its confinement within safe limits. Every patient who is subjected to operation should be treated as very ill (handicapped group), and all the details of the technique should be employed. *I am confident that unless this is followed, the surgeon will not be able to master the technique and will not observe the difference in the results.* Handicapped patients are too few to give sufficient experience for the development of the necessary technique. In addition, this more careful treatment will add to the comfort, if not to the safety, of the ordinary individual who can stand considerable operative trauma and bad anesthesia.

The surgeon should be familiar with a large number of such accurately kept records before he reaches the position of proper interpretation.

RECORDING THE BLOOD PRESSURE. During every operation a chart should be kept. On this special chart the pulse and respiration should be recorded every five or ten minutes. The interval for the blood-pressure notations may vary. If possible, it should be read and recorded every ten to twenty minutes. The surgeon notes at different intervals of time just what manipulations he is making, for example: Skin incision, division of peritoneum, pull on mesentery, exploration of common duct, introduction of sponge, forced retraction, division of stomach with cautery, division of nerve, etc. He also notes before such manipulation, whether the tissues are infiltrated with novocaine or not. The surgeon, therefore, dictates to the keeper of the chart exactly what he is doing; the latter records it on the chart. The anesthetist hears these remarks and is kept well informed as to the operative manipulations. The anesthetist dictates to the keeper of the chart his observations—the color of the patient, whether cyanotic or not; whether the patient moves or struggles; whether there is straining or vomiting. The surgeon also watches for, and reports, the condition of the blood, because often the surgeon is able to recognize cyanosis from the condition of the blood in the wound earlier than the anesthetist from the face and mucous membrane of the patient. The chart-keeper reports at frequent intervals the effect on pulse, respiration, and blood pressure. The surgeon, anesthetist, and chart-keeper, therefore, work together, and very quickly become familiar with and record those manipulations which affect the pulse, respiration, and blood pressure.

Under chloroform, the patient is quiet and of good color. The blood pressure, before any other sign, warns the surgeon that his manipulations are painful. Under deep ether narcosis, the same is true. But, if the patient is very lightly under ether, these painful manipulations produce some movement on the part of the patient,

or contraction of the muscles. The sensitiveness, however, of certain tissues is best shown when the patient is narcotized with nitrous oxide and oxygen. This anesthesia, therefore, which is not only best for the patient, is also the best for instructing the surgeon as to those operative manipulations in different regions, which produce sensory impulses and in time cause shock.

Crile has shown, and I have confirmed it in my own work, that many of these impulses can be blocked by infiltration of the tissues with novocaine. When a nerve is exposed it should be immediately infiltrated.

I am convinced that operations performed after this scheme will soon train the surgeon how and when to block these sensory disturbances, and, when they cannot be blocked, how to manipulate the tissues in such a way that the nerve cells are affected but slightly or not at all.

In my second paper I propose to illustrate and discuss in detail charts illustrating these points.

NITROUS OXIDE AND OXYGEN ANESTHESIA. The method of administration of this anesthetic is more difficult than of chloroform or ether. However, the ordinary resident surgeon, under proper directions, usually becomes proficient for the ordinary case in two or three months.

About one-half hour before beginning the administration of this anesthetic the patient should receive hypodermically morphine and atropine. My usual dose is morphine $\frac{1}{6}$ grain, atropine $\frac{1}{150}$ grain. The dose may be increased or diminished according to the age and weight of the patient. I prefer, however, to start with the minimum dose and repeat, if necessary, after the anesthesia has begun. Crile often uses scopolamine and morphine. I have as yet not employed this combination.

The patient is prepared for operation. The anesthetic is started. It should be emphasized here that cyanosis, if possible, should always be avoided. Cyanosis is dangerous if prolonged. Even if it were not dangerous, it produces greater muscular contractions. The patient is first given nitrous oxide and then oxygen. The art of administration depends upon the anesthetist's ability to obtain the proper combination of nitrous oxide and oxygen to produce narcosis without cyanosis.

One should expect narcosis within five minutes. If this does not take place, it may be the fault of impure gas, some leak in the apparatus, of the anesthetist, or, it may be entirely due to the patient. Certain individuals do not take this anesthetic well. When the surgeon finds that with a combination of local infiltration of novocaine and the nitrous oxide and oxygen anesthesia the patient is not sufficiently narcotized, I advise to repeat the morphine hypodermically (dose, $\frac{1}{10}$ grain). If this has not the desired effect, add to the anesthesia a few

drops of ether. In the majority of cases with this method one will get a most satisfactory anesthesia.

I cannot discuss here the difficult cases. But, if the anesthetist is skilled, and the surgeon patient, the operation can be performed under this method of anesthesia.

I prefer the Gatch apparatus,¹ and employ rebreathing in certain cases during the operation, but I shall not discuss here the different forms of apparatus. I advise, however, that when this method of anesthesia is introduced in a clinic, some simple type, like the Gatch apparatus, be first tried. This has an attachment for the additional administration of ether, when necessary; with it the gases can be mixed and given continuously without too great pressure, and, in addition, rebreathing can be used when indicated.

I have employed the more complicated and expensive apparatus in which the gases are given under greater pressure, but have agreed with my special anesthetist that these apparatus had surely no advantage. In addition, the amount of gas used is greater and the method, therefore, more expensive.

Surgeons will find at first that operations under nitrous oxide and oxygen anesthesia are more difficult. The patient is not always perfectly quiet. Even with the infiltration with novocaine, the muscles are not relaxed. In abdominal work it is more difficult to keep the intestines out of the way, and this is the reason for my saying that the surgeon must be more patient.

But the disadvantages from the surgeon's standpoint are really helpful to the patient, because if the surgeon wishes to operate under pure nitrous oxide and oxygen anesthesia, he is forced to be gentle, he learns very quickly the manipulations that wake the patient, cause him to move or contract the muscles. Now if he develops a technique by which he is able to overcome these disadvantages, without the addition of ether, he certainly will produce less traumatic shock, and therefore have less mortality, fewer postoperative complications, and a shorter convalescence.

Nitrous oxide and oxygen anesthesia allows the surgeon, therefore, to investigate with the sphygmomanometer, better than ether or chloroform. In making this investigation, he is administering to his patients the safest anesthetic, and, in addition, he is training himself to operate with the least trauma. The advantages of this anesthesia, therefore, are triple.

THE INTERPRETATION OF THE BLOOD-PRESSURE READINGS. The problem which I have placed before myself in this investigation is an attempt to estimate the vital resistance of the patient based upon the pre-operative examination, the nature of the operation and the continuous observation of the effect of the different operative manipula-

¹ Journal of American Medical Association, March 5, 1910, liv, 775.

tions upon the pulse, respirations, and blood pressure during the operation.

The question might naturally be asked, of what value is this more careful study of the patient before operation, and this more painstaking and elaborate observation with an instrument of precision during operation?

It is my opinion that shock is a very definite factor in the mortality of surgery today. The number of cases who die of shock during, or directly after, operation is relatively small in the majority of cases. But, in others, it is relatively high.

Shock as the cause of death is relatively high in the following operations and surgical lesions:

In immediate operations upon patients with accidental injury; in patients depressed by acute infections and long chronic infections; in major operations upon patients depressed by the disease, for example, cancer of the stomach, pyloric obstruction with starvation; in patients profoundly affected by toxemia, such as exophthalmic goitre, auto-intoxication after intestinal obstruction, trypsin poisoning in acute pancreatitis, uremia, diabetic coma, obstructive jaundice.

In all of these cases the patients are already overburdened by the acute or chronic disease. An operation may be imperatively urgent as the only chance of recovery. This operation must be performed with a minimum of shock from the traumatism of the operation, from the toxicity of the anesthetic, and from hemorrhage. It must also be so proposed to the patient as to avoid the psychic shock as far as possible.

In some operations, the amount of necessary traumatic shock is very great, and this may be fatal in certain individuals. For example, in the combined abdominal and sacral operation for cancer of the rectum, the traumatic shock is difficult to keep within safe limits. To perform this operation under pure nitrous oxide and oxygen anesthesia is very difficult, and only possible in the hands of surgeons and anesthetists with large experience with this method of anesthesia.

Nephrectomy, in certain cases, complete panhysterectomy for cancer of the uterus, hysterectomy for adherent myoma, extensive dissection for cancer of the breast in its late stages, many operations upon the brain, the removal of a large portion of the colon in patients debilitated by colonic toxemia are all operations which under certain conditions are associated with extreme traumatic shock.

One needs only study large statistics of these operations, even in the hands of experienced surgeons, to learn that shock is a definite factor in the mortality.

In addition to this, when the patient's resistance is lowered by the shock of the operation, postoperative complications with a higher mortality are more frequent. For example, pneumonia, thrombosis and embolism uremia and anuria, cardiac failure in patients with

myocarditis or disease of the valves, acute dilatation of the stomach, dynamic ileus, intestinal obstruction and acidosis.

The immediate mortality and fatal postoperative complications of the ordinary operation on the unhandicapped individual are today relatively small, but I am confident that an investigation of a large number of cases by any individual surgeon will illustrate that with Crile's technique of nitrous oxide and oxygen anesthesia and local infiltration of novocaine combined with a more intelligent and careful method of operative manipulation, the mortality will be lessened. In this group an attempt to lessen our mortality should be made, because these patients should practically run no risk from the operation. In the other group of handicapped individuals and relatively more dangerous operations, the difference in the mortality, I am sure, will be found to be very great, and I am also confident that these operations should be performed upon such handicapped individuals with a distinctly lessened risk.

I have stated before, but it will bear repetition, that it is impossible to develop this technique, or appreciate the difference in the results, without making it a routine procedure in all cases.

It is also my opinion that the employment of the blood-pressure instrument in all operations will be found to be the most important agent for the development of this technique and for the accomplishment of the object of the technique—lessened mortality, shorter and more comfortable convalescence.

As to the methods for the estimation of the vital resistance of the patient before operation, I must refer to my previous publication.¹

From this pre-operative investigation, we obtain a general idea of the condition of the patient, and in course of time will learn to judge more accurately what the particular patient will stand.

Now if we carefully study, in addition to the pulse and respirations, the blood pressure, we will be able to more accurately interpret these records and decide how this special individual is withstanding the operation.

This accumulated experience, I am confident, will allow us to finish some operations with less shock, and perform others in two or more stages, and in both instances accomplish the cure with a minimum mortality.

In this review, as I have already stated, I propose to give only a sketch of the interpretation of the blood-pressure readings, because, in the first place, the object of this communication is chiefly to emphasize the value of the blood-pressure reading and nitrous oxide and oxygen anesthesia, and, in the second place, I am by no means prepared to speak dogmatically in regard to the blood pressure.

¹ Annals of Surgery, May, 1912.

I do not believe that any surgeon today has had sufficient experience to teach others the value of the changes in the blood pressure during operation. We will only be able to teach each other when all of us employ this method in our operative work. So far in my experience I can state that I have confidence in the value of the blood pressure. My records show that changes in the blood pressure are a better index to the extent of the trauma of the operation than the pulse or respiration alone; that the blood pressure gives warning of shock before either pulse or respiration react, so that we can interrupt the operation and institute treatment in time. These records also show the great danger of chloroform and that nitrous oxide and oxygen anesthesia is better than ether. With nitrous oxide and oxygen anesthesia, combined with the local infiltration of novocaine and controlled by blood-pressure readings, I have attempted successfully operations on which, previous to this experience, I should not have ventured. I am confident that my records will show a decreased mortality, fewer postoperative complications, and a shorter and more comfortable convalescence.

My experience up to the present time with blood-pressure readings brings out the following facts:

We have not been perplexed with the interpretation of blood pressures higher than 180, except on a few occasions.

The blood pressure, when the patient reaches the operating room, with rare exceptions, is always higher (10 to 20) than that recorded in the ward. This is psychic, and has already been recognized.¹

In patients very ill from any cause, this psychic elevation of the blood pressure rarely takes place.

When the usual and expected rise of blood pressure does not take place when the patient enters the operating room, we may conclude that the patient is not in good condition for operation, and this finding is more significant if the blood pressure is relatively low.

Unfortunately, except in a few clinics, the blood-pressure records are not made until the patient gets to the operating room. I now enforce the rule of a number of records before the patient comes to the operation, because such records give the surgeon an index to what may be looked upon as normal for the particular individual.

The moment nitrous oxide and oxygen anesthesia is begun, the blood pressure rises again from 5 to 15 in the ordinary individual. If there is any struggling or cyanosis, the blood pressure rises higher still. The rise in blood pressure in nitrous oxide and oxygen anesthesia may be due to the slight cyanosis or asphyxia which always accompanies this form of anesthesia, no matter how well it is given. The quieter the patient, and the less the cyanosis, the less the rise of the blood pressure, but there is always a rise in the average individual.

¹ A. W. Hewlett, *The Clinical Study of High Blood Pressure*, *The Bulletin of the Medical and Chirurgical Faculty of Maryland*, June, 1912, iv, 211.

When this does not take place we may be pretty certain that the patient is suffering from a certain degree of shock.

After the first fifteen or twenty minutes, if the patient is quiet, the anesthetic well taken, and there is no cyanosis, we should expect a slight fall in the blood pressure, and if the manipulations of the operation are not painful, the blood pressure will remain at about this level until the end. When the gas is taken off the blood pressure falls from 5 to 15.

In the normal case, therefore, the blood pressure rises when the patient enters the operating room (psychic); it rises again with the beginning of anesthesia (asphyxia); it then falls, but to a point higher than the ward record. When the gas is taken off, the blood pressure falls again to the level of, or a little lower than, the ward reading. Such a series of readings is an indication of a minimum of shock.

Ether produces a rise in blood pressure, but not as distinct as nitrous oxide and oxygen. The blood pressure under ether narcosis is relatively lower than under the gas, and the fall of the blood pressure in the normal case is less distinct when the ether is removed than after gas.

This observation suggests that nitrous oxide and oxygen is a safer anesthetic in cases shocked from injury, infection, or disease, and I have recent clinical experience and blood-pressure records which prove this.

Observation 1. Traumatic shock with retroperitoneal hemorrhage due to complete rupture of the left kidney.

This patient was seen in the operating room six hours after the injury. He was pulseless and presented the classical clinical picture of shock. The blood pressure was below the lowest reading of the instrument. The patient was placed in a comfortable position, head low, given morphine, and warmed with hot blankets; in ten minutes the blood pressure was recorded at 85; now salt solution was given intravenously, and the blood pressure rose to 88. The patient was then given nitrous oxide and oxygen to reduce a thyroid dislocation of the right hip, requiring about five minutes: the blood pressure rose to 90.

In this patient there was no psychic influence on the blood pressure, but the gas did produce a slight rise. The patient was distinctly better after the reduction of the dislocation under gas.

In view of the increased area of dulness in the left flank, I felt that it was imperative to explore the right kidney and check the hemorrhage. We prepared for blood transfusion in such a way that the moment the renal hemorrhage was checked, the direct transfusion of blood could begin.

The patient's blood pressure remained between 90 and 95 until I began to push the peritoneum in order to expose the kidney. The gas, therefore, aided in maintaining pressure, but this trauma, which in the normal individual produces a rise in the blood pressure, here

resulted in a fall. During the manipulation necessary to check the hemorrhage from the completely ruptured kidney, the patient again became pulseless and the blood pressure could not be recorded. Fortunately, it required but a short time to check the hemorrhage. Then, again fortunately, the direct transfusion was successful. After the vein of the patient began to pulsate it was fully ten minutes before the pulse of the opposite arm could be felt and the blood pressure recorded at 85; it then gradually rose to 100. The transfusion was maintained for forty-five minutes.

In this case the estimation of the blood pressure was very helpful in determining what to do, and the psychological moment to do it. I am confident, from previous experience, that this patient's chances of recovery with ether as the anesthetic would have been relatively smaller, and with chloroform he would have had no chance at all.

Railroad surgeons should employ nitrous oxide and nitrogen in their accident cases suffering from shock whenever this is possible.

Observation 2. Toxic shock from acute dilatation of the stomach and intestinal obstruction.

This case has been mentioned in my paper before the Surgical Section of the American Medical Association as an example of acute dilatation of the duodenum, secondary to intestinal obstruction. I select this case again, because it illustrates the helpfulness of a blood-pressure record in a desperate situation, and the value of gas as an anesthetic in cases of extreme shock.

This patient had been operated upon for general peritonitis secondary to a perforated appendix. Her local appendicular symptoms had been present for seven days, and the peritoneal for two days. Her condition was desperate when she was operated upon. Drainage was instituted both through the McBurney incision and through a second, suprapubic, cut. She suffered for a few days after operation from dilatation of the stomach and meteorism. This was finally relieved by gastric lavage and enemas. Then there was a period of freedom from all serious symptoms for four days, when suddenly vomiting and absolute obstipation set in. Repeated lavage of the stomach kept the stomach empty, relieved the epigastric distress, but the bowels did not move, and after forty-eight hours it was evident that something had to be done to relieve the obstruction. The patient, of course, had had no food; she was weakened by a long illness; there had been a desperate infection. Her blood pressure in the ward registered 90. She was placed on the operating table, but the blood pressure showed no changes. She was then given intravenously 1 mg. of strophanthin. In ten minutes the blood pressure rose to 96. This encouraged me to proceed. Gas was administered, and she became narcotized without any struggle or increased cyanosis. She was cyanotic before from her toxic condition. It required fully thirty minutes to do the necessary operation.

The obstruction in the pelvis was relieved, the small intestines handled from the cecum to stomach; pus pockets were removed, one of which was producing the duodenal obstruction; an enterostomy made in the small intestine and the wound closed. During these manipulations the blood pressure remained about 90; toward the end of the operation intravenous salt solution was given, and perhaps the rise in the blood pressure due to this compensated for the usual fall after the discontinuance of the gas, because, when the gas was removed, the blood pressure remained about the same. This patient recovered.

These 2 cases illustrate, at least in my hands, the helpfulness to a surgeon of a blood-pressure record, and that gas is the best anesthetic in shock.

My experience with chloroform is limited. In most cases there is no rise in the blood pressure when the administration of chloroform is begun. Very quickly there is a fall.

Observation 3. This case illustrates the different effects of chloroform and gas on the blood pressure.

The patient had a large retroperitoneal tumor in the region of the left iliac and psoas muscle. Before operation, his blood pressure was recorded at about an average of 130. He was suffering so much pain that when he first entered the hospital he was taking from 10 to 12 grains of morphine daily. After one week's rest, we were able to reduce this to $2\frac{1}{2}$ grains. It has been my experience that patients who were taking large doses of morphine are bad subjects for either gas or ether anesthesia, and that although they take chloroform well, this anesthetic affects them profoundly.

In this case, under gas anesthesia, the patient struggled and did not take it well, but the blood pressure rose first to 150 and then fell to between 120 and 130. The local operation was performed after infiltration of the tissues with 1 to 400 novocaine solution. This combination was sufficiently effectual to allow me to expose the tumor. But when I opened the peritoneal cavity for a better exploration, I found that I could not close it on account of the straining of the patient. He was then given chloroform for twenty minutes—simply long enough to close the peritoneal cavity. He became quiet at once, the intestines fell back, the pulse became slower, but the blood pressure fell to 90 in twenty minutes, and he was distinctly shocked, so much so that I discontinued the operation. At the second operation ten days later, under pure gas throughout, there was no such fall in the blood pressure.

When the patient takes the gas well, has good color, and the operation does not produce painful impressions, the pulse, respirations, and blood pressure remain practically unchanged. If, during the operation, sensitive tissue is pulled or cut, the blood pressure rises. As a rule, the blood pressure is more sensitive in its reaction to these sensory disturbances than either pulse or respiration. If the patient is under

pure gas and oxygen, there will be some motor reaction with the rise in blood pressure due to the painful manipulation. Now, if this patient were under ether or chloroform, the surgeon would not be aware of his trauma unless he were keeping a blood-pressure record, and this has seldom been done. I am inclined to think that this explains the prevailing impression among surgeons that, under gas, these painful impressions which make the patients move are more apt to produce shock than when the patient is quiet under ether or chloroform. My experience demonstrates the reverse is true: That the patient quiet under ether or chloroform narcosis is more profoundly affected by these sensory disturbances than when under gas alone, and I shall bring this point out in my second paper.

These traumatic insults of the operation which at first increase the blood pressure, later depress it.

Now, if a surgeon during an operation is constantly reminded that he is increasing the blood pressure, he knows that in the end he must produce shock, and if he observes that the painful impression lowers the blood pressure, he knows that the patient is in shock and that it is time to interrupt the operation and institute treatment for shock.

In my second paper I expect to take up the details of this interpretation with illustrative charts.

I have attempted here only to give an impression of the value of nitrous oxide and oxygen anesthesia in conjunction with the use of the sphygmomanometer, and for those who care to read further I have selected from the literature the following more important communications.

The literature on nitrous-oxide anesthesia which has accumulated in the last six months is very large. I will give here a few references: Allen,¹ Martin,² Southgate Leigh and others,³ E. M. Prince,⁴ M. Salzer,⁵ F. J. Cotton and Walter M. Boothby.⁶

In previous numbers of *PROGRESSIVE MEDICINE* I have discussed nitrous-oxide-and-oxygen anesthesia, as well as other forms, in considerable detail. It is my opinion that the most important thing to do now is to concentrate our attention on the combination of nitrous oxide and oxygen as a general anesthetic, in combination with novocaine as a local.

Blood pressure has also been discussed in previous numbers of this journal.⁷

¹ *Journal of American Medical Association*, 1911, lvii, 1599.

² *Ibid.*, p. 1115.

³ *Ibid.*, 1912, lviii, 1146.

⁴ *Ibid.*, p. 1342.

⁵ *Ibid.*, vol. lix, p. 67.

⁶ *Surgery, Gynecology, and Obstetrics*, 1912, xiv, 195; xv, 281.

⁷ A. A. Howell, *Archives of Internal Medicine*, 1912, ix, 149; A. W. Hewlett, *Journal of American Medical Association*, 1912, lviii, 1627; G. N. Stewart, *Archives of Internal Medicine*, 1912, ix, 706; H. K. Thomas, *Surgery, Gynecology, and Obstetrics*, 1912, xiv, 85.

LOCAL EFFECT OF INJURIES

Wounds. The following is a classification which I have employed for teaching purposes and for the study of the literature.

A. Accidental wounds.

1. Subcutaneous wounds (closed wounds, contusions).
2. Open wounds (incised, lacerated, etc.).

B. Operative wounds.

The immediate effect of a wound:

1. Hemorrhage.
2. Portal of entrance for infection:
In operative wounds insignificant.
In accidental wounds may be slight or grave, according to where and by what foreign body the wound has been inflicted.
3. Laceration of tissue.
 - a. Good circulation.
 - b. Poor circulation. (Transplantation of tissue.)
4. Interference with function.

The healing of the wound.

1. Per primam.
2. By granulation.

The late effects of a wound.

1. Secondary hemorrhage. (Hematoma, aneurysm.)
2. Secondary infection.
 - a. The relation of trauma as a factor in localizing infections already present in the blood current.
3. The late results of improperly healed lacerated tissue. This varies with the different tissues.
4. The late results of interference with function. This depends upon the primary laceration of tissue, or the secondary results due to scar tissue.
5. The healing of the wound.
 - a. The inflammatory process may be insufficient, as in ununited fracture, hernia in abdominal wound.
 - b. The inflammatory process may be excessive, giving rise to benign scar-tissue tumors—keloid, granulation-tissue tumors, excessive callus formation in fractures.
6. The relation of trauma and wounds to benign and malignant tumors.

All of these problems of accidental and operative wounds, of subcutaneous and open wounds, of the immediate and late effects of wounds can again be studied in relation to:

1. Special tissues: Skin, subcutaneous tissue, muscle, tendon, nerves, joints, bursæ, periosteum and bone, bloodvessels (veins and arteries), lymph vessels, mucous membrane.

2. Special glands and organs—the breast, thyroid, salivary glands, lungs, heart, liver, spleen, pancreas, kidney, testicle, ovary.

3. Special regions—head, neck, chest, abdomen, spine, groin, popliteal space, etc.

Each tissue, gland, or organ and region presents special problems of its own.

The two chief dangers of accidental wounds are hemorrhage and infection. In the operative wound, the surgeon practically controls both. In the accidental wound, the main danger to life is from hemorrhage. As a matter of fact, however, even in military practice, the number of deaths from primary hemorrhage is relatively small. If the patient is not dead or dying when he comes under the care of the surgeon after an accidental wound, further hemorrhage can, as a rule, be checked, and the shock from injury and hemorrhage treated by appropriate means, of which blood transfusion is the most important when the loss of blood has been great.

Now, as a matter of fact, the infection in the majority of accidental wounds is not of a virulent character, and, if the patient receives prompt surgical attention, there is little danger of death from infection, except in tetanus.

In the majority of accidental wounds, the tetanus antitoxin should be given.

The patient with an accidental wound runs a second risk from infection when he enters the hospital, because in the out-patient department infected cases are received, and the entire out-patient staff handle infected cases without gloves. I am convinced that many of the infections observed in accidental wounds admitted to large hospitals and attributed to an infection at the time of the injury, were truly secondary infections acquired at the hospital.

The first dressing, therefore, of an accidental wound should be performed under the same aseptic protection as a wound made at an operation. It seems strange that surgeons who make these careful preparations before making a wound do not also follow this rule when the wound has already been made.

When a wound has been made by a surgeon in the course of an operation and an infection follows, he has no one but himself to blame, but when the wound is accidental, and he is called upon to treat it, and an infection follows, who can tell when the infection took place?

Conceded that surgeons and physicians have the best conscience and character of any group of individuals, nevertheless this factor of divided responsibility has its influence.

I have again and again each year gone over the literature in regard

to the treatment of accidental wounds, and I do not find this point emphasized as it should be.

The main point in the treatment of an accidental wound is to look upon it as an operative wound, and let no infection take place from the moment it comes under your care.

If this wound is produced by a foreign body known to be infected, for example, a knife, or a needle during an operation on an infected case, or the hand of a bacteriologist in his laboratory, or a pathologist at autopsy, or a nurse or a doctor dressing wounds in the ward, or a foreign body soiled with dirty dressings, then the treatment is entirely different from that for the ordinary accidental wound.

If we conclude, from the history of the accident and the nature of the foreign body, that there was opportunity for a virulent infection, then we should immediately place an Esmarch bandage above the wound, encourage bleeding, enlarge the wound if necessary, disinfect it with pure carbolic acid or the cautery. In some injuries, like a needle tract, or a larger perforating wound, the tissues involved should be excised.

All such wounds should be left open. Gauze should not be employed, except for oozing, or hemorrhage. The wounds can often be kept open by rubber tissue or protective, and should be treated as if already infected, that is, a Bier bandage should be applied and active hyperemia should be produced by hot wet applications or dry heat. Except for the immediate cauterization of the wound, the ordinary antiseptics seem to be of little more value than irrigations with sterile hot solutions, of which salt solution is the best.

Pfannenstiel's method, which I will discuss later under infected wounds, might be employed here.

Other accidental wounds can be closed if the circulation of the injured tissue is good. If this lacerated and contused tissue can be excised, then the wound can be closed. If the circulation is not good or doubtful, the wound must be left open or drained.

The longer the interval of time between the accident and the first treatment of the wound, the greater the opportunity for secondary infection.

WOUND TECHNIQUE. As just stated, the principle should be the same for the treatment of both accidental and operative wounds: Gloves should be worn, if possible; the skin should be prepared in the same way; the accidental wound should be irrigated with salt solution before and after the surrounding skin is cleaned, and should be packed with sterile gauze during the cleansing of the skin.

Surgeons are beginning to have more confidence in 95 per cent. *methyl alcohol* than in any other chemical disinfectant. This should always be employed. *Tincture of iodine* seems especially appropriate for accidental wounds, because with it one can disinfect the skin without contaminating the open wound.

In military practice, and where the first treatment of the wound must take place outside of a hospital operating room, iodine seems to offer the best safeguard.

The same investigations have not been made for accidental wounds as for operative wounds, and there seems to be room here for a thorough re-study.

Conrad Brunner,¹ before writing his monograph on wound treatment for the *Deutsche Chirurgie*, consulted 122 surgeons throughout the world as to the methods employed. He found exceptions to every rule, but the great majority of surgeons wear rubber gloves in all operations, depend chiefly upon alcohol for cleansing the skin, prefer the dry aseptic method in clean operative wounds, prefer catgut for ligature and buried suture; tincture of iodine is gaining favor; in accidental wounds and infected operative wounds, antiseptic methods are employed. In the discussion² on wound technique by British surgeons I find that, as a rule, in England, gloves are worn less frequently and the antiseptic method is perhaps more commonly employed than the aseptic. In my opinion, the choice between asepsis and antisepsis is insignificant as compared with gloves or no gloves. If a surgeon does not wear gloves, he will naturally use antiseptics; if, however, he wears gloves, he will find antiseptics, except for the cleansing of the skin, unnecessary in clean cases. There is no doubt that antiseptics are an additional safeguard when asepsis cannot be maintained.

V. Hecht and R. Koehler³ re-studied the wound technique in von Eiselsberg's clinic, in Vienna, with the conclusion that one can overdo the scrubbing with soap and water, especially just before operation; that, on the whole, the best disinfectant for the skin after a short scrubbing is alcohol. They employ gloves.

INFECTIONS

All infections or infectious diseases must have a portal of entrance. When the local inflammatory reaction at the portal of entrance is sufficient to excite the attention of its host, or to be demonstrated by the examining physician, we can speak of the lesion as the local infection.

The most important point in the treatment of infections is the early recognition of the local area primarily involved, because treatment in this stage will frequently avert general infection.

When the reaction at the portal of entrance is slight, and the first signs of the infection are general symptoms, the infection is called cryptogenic.

As I have frequently stated before in these reviews, we have made

¹ Centralbl. f. Chir., 1910, Supplement No. 31, p. 6.

² British Medical Journal, October 28, 1911.

³ Centralbl. f. Chir., 1911, p. 1127.

little progress in the treatment of general infection. From a surgical standpoint, at the present time, the chief hope of reducing the fatality in infections rests in the education of the public on the importance of attention to apparently insignificant injuries of the skin and mucous membranes, and more or less innocent local areas of inflammation of the character of pimples, boils, slightly infected wounds, infected corns, ingrowing toe-nails, etc.

This education is part of the new branch of preventive surgery which I have already mentioned.

In the healthy individual, a local infection is less apt to become general than in individuals handicapped with certain diseases.

It should be the responsibility of the family physician to caution his patients having diabetes, arteriosclerosis, nephritis, and chronic alcoholism against the greater dangers of insignificant wounds and infections.

My own records show a large number of cases of gangrene of the upper and lower extremity beginning in very slight injuries of the finger and toes, occurring in patients suffering with the disease just mentioned. I have as yet failed to find a single patient who had been cautioned by his physician about the greater danger of such lesions. In the beginning these patients have treated the cut, the wound of a splinter, the bruised corn, the blister from a tight shoe, the infected hang-nail, the ingrowing toe-nail, or the small furuncle themselves. They have consulted their physician only after the local inflammatory process had extended. The increasing edema, the extending blush of erythema, the red lines of lymphangitis, the tender lymphatic glands, or the dusky hue of beginning gangrene, and the pain have frightened them. Treatment in this stage, even in the unhandicapped patient, demands more extensive operative methods, the results are not as satisfactory, there is often loss of function from involvement of tendons, joints, or bone, and even mutilation from unavoidable amputation. In the handicapped patient in this stage an amputation usually offers the only hope of saving the patient's life.

The physician is often not impressed with the dangers of infection in this stage. He looks upon the treatment of such infections as minor surgery and makes the incisions himself, or resorts to local treatment of some kind.

I have a large number of records of cases of this kind, and these show (1) the ignorance of the public, and (2), in many instances, the confidence of the surgically untrained physician in his ability to take the responsibility of the treatment.

In large hospitals, too, the treatment of these cases is often left in the beginning to the interne of least experience, and these patients get the attention of the chief surgeon only in the late and most unsatisfactory stage.

The treatment of all of these infections in the early stage requires considerable surgical experience and skill. With these the results are most gratifying.

The surgeon with proper experience and training should be able to decide at his first inspection just what line of treatment should be followed, and should not consider the result satisfactory unless he, from the onset, prevents the infection from extending, wards off general infection, and accomplishes a cure without mutilation. When he is called upon to treat an infection in its later stage, he is between the dilemma of local mutilation and the danger of death from general infection.

Even a surgeon connected with a large hospital does not get an experience with cases of this kind as rapidly as he does with appendicitis.

To treat these cases successfully, one should have a proper conception of the inflammatory process, should understand how the infections due to the different bacteria vary in their local manifestations and tendency to local and general dissemination. Bier, in his contribution on active and passive hyperemia, has added more than anyone else in recent years to improve our conception of infections and their rational treatment. The knowledge of the pathological process called inflammation, the contribution of Bier to hyperemia, and the easily accessible literature on the various types of infection are essential to any surgeon who undertakes the treatment of these lesions.

In brief, when possible, excision of a local infection is better than the older form of incision. Multiple small incisions are more efficacious than one large incision. If these are indicated, the sooner the operation is done the better. In the ideally treated cases there should be but one operation, and the infection should be stamped out at the first treatment. Repeated operations lower the resistance of the individual, especially the handicapped one. Except in the very early stage, or in infections of low virulence, local anesthesia by the infiltration method has its dangers. The infiltration of the tissues about the infection seems to lower its resistance, and may be followed by a dermatitis, or cellulitis. The best anesthetic is nitrous oxide and oxygen. In the last year I have used the Paquelin cautery extensively to eradicate the local infection. Where formerly I excised carbuncles with a wide zone of healthy tissue, I now burn out the infected tissue with the hot iron. The operation is done more quickly, fewer clamps are required, especially when the carbuncle is situated on the neck, the wound is much smaller and heals more rapidly. I urgently recommend to surgeons to employ the Paquelin.

In the abscess stage of an infection there has been an old rule for a wide incision, leaving a huge wound. In the majority of cases, surgeons less bound by traditional methods of treatment have found that

small incisions which evacuate the pus accomplish just as good results and are followed by a much more rapid healing.

An abscess is a late stage of an infection. It indicates a local and general immunity. There may be fever and leukocytosis with it, but these symptoms of general infection have not the same significance as in the stage of the infection before the abscess formation. An abscess is a cavity lined by young, vascular granulation tissue. This granulation tissue is almost as protective as the skin and mucous membrane. The moment a small incision is made and the pus escapes, the abscess collapses. If this pus is washed out with normal salt solution, one need not necessarily use a disinfectant—a bit of rubber tissue is introduced into the incision, and the walls of the abscess cavity are pressed together with a dressing of cotton and collodion, or with gauze and bandage, the two surfaces of granulation tissue grow together and in some cases heal almost like a fresh wound. Again and again have I observed this in abscesses of the neck from infected tonsils or teeth, and abscesses in the axilla, groin, and other areas.

Even today such abscesses are frequently treated by large incisions and packing with gauze. The objection to such treatment is that it is usually unnecessary. It does not relieve the infection in most cases any better, and the wound requires longer to heal.

In the more chronic abscess, in which the granulation tissue is less vascular, and there is beneath the granulation tissue a fairly thick fibrous base, this treatment is less successful. These abscesses need irrigation with irritating chemical substances, like formalin and iodine, to stimulate the granulations, and in some cases, the wall itself must be excised. It requires considerable experience to know when to make the small incision, when the large, when to use irritating chemical irrigation, and when to excise the wall of the abscess.

I have mentioned that it is better to excise than to incise a local infection, when this can be done without mutilation or danger to neighboring tissues, such as joints or tendons.

Of course, the incision relieves tension, gives an opening through which the secretions may escape, and in the past has often been successful. But, in my experience, incisions into infected tissue are frequently unsuccessful. They have to be repeated and may again be unsuccessful. Many of the cases of rather simple infection which I have been called upon to treat have had one or more of these incisions. Now, if the area of the local infection is of such limited extent that it can be excised, as stated before, without mutilation, or involvement of the function of neighboring tissues, we eradicate at once all the infected tissue and leave a wound lined by healthy tissue. Such a wound will heal more rapidly than the infection treated by a simple incision. Even in those cases in which all the infected tissue cannot be excised, a linear incision is never as efficacious as a partial excision of a diamond-

shaped piece of skin and subcutaneous tissue. The linear incision must be kept open by drainage, while the excision remains open and drainage need not be employed unless specially indicated. The linear incision is applicable and efficacious only when there is a collection of serum or pus.

I call attention to these simple operative methods, because I find that they are not generally understood or adopted.

The theories and their practical application as formulated by Bier are not well understood. The rubber bandage, which is to be placed on the arm or thigh above the infection, is usually drawn too tight. This bandage should be of the thinnest rubber—the Martin bandage; it should go around the arm or thigh in at least two and one-half widths; it should never be tight enough to cause pain or produce edema. The bandage should be immediately removed and replaced when it is uncomfortable, and allowed to remain off at least two hours before readjustment. In the majority of cases it is better to have the bandage on six hours and off two hours, but in more acute cases the best results are obtained by changing the bandage about every two hours, leaving it off from one-half to one hour.

In addition to this passive hyperemia, active hyperemia should be induced by baking in hot, dry air, immersion in hot salt solution, or covering the part with gauze wet in hot salt solution. This treatment, however, requires great attention to details. There is always danger of a burn which, of course, would complicate the infection. In my own clinic in the last week one of the residents was burned with a hot water bag in spite of the fact that his fellow-residents were apparently most faithful in watching his treatment. Fortunately, the infection was one of a lesser degree, and the burn did not interfere with the result. In this same clinic in which a number of patients receive baking in hot air every day, one patient, suffering with diabetes and gangrene of the little toe, due to arteriosclerosis, received a burn on the heel in the hot-air chamber, which gave us more trouble than the gangrenous toe. The Martin bandage for hyperemia, the baking in hot air, and the hot moist applications must be watched with the greatest care.

In using the moist hot applications, I take a roll of gauze, wring it out in hot salt solution, and apply it as a bandage to the arm or leg. Over this is placed a large piece of dentists' rubber dam. This keeps the heat for some hours. If the hot water bag is placed against this thick padding there is no danger of a burn. Intelligent patients will follow instructions without danger, and many of these dressings may be left to a senior nurse.

When the extremity is baked in hot air it should be devoid of any dressing, dry, and properly protected by the appliances which accompany the baking apparatus.

One must not expect too much of active and passive hyperemia.

If there is any doubt as to the method of treatment, always operate upon the local infection and follow this with active and passive hyperemia. There is never any harm from such treatment. If this operation is unnecessary, the only drawback is the time occupied by the healing of the wound. If one, however, makes the mistake of postponing the operation upon the local infection, and takes gambler chances with the hyperemia, the most opportune time for the operation may be lost, and the consequences serious.

In going over the literature again, I find that the few communications¹ in regard to *alcohol* and infection all agree that the chronic alcoholic has less local and general resistance to infection than the ordinary individual. In these cases, therefore, one must be more radical locally. The non-operative methods of treatment should be rarely tried alone. The local infection should at once be excised, if possible. There is a difference of opinion, however, in regard to the use of alcohol as a drug. I agree with those who are of the opinion that alcohol should never be given in any infection to an individual who has not used alcohol before. As to the alcoholic individuals, my personal view, based upon experience, is that they do better without any alcohol. The authorities, however, favor the employment of alcohol in chronic alcoholics with the early symptoms of delirium tremens. This may be true for the medical condition only, but, in my experience, it is not so when the medical lesion is complicated by a surgical one, such as an infection, or an operation with or without anesthesia.

The individual with diabetes has distinctly less resistance to infection. I have dwelt upon this before. Handmann² furnishes further evidence of this lowered resistance in his paper.

I can find nothing in recent literature on immunity and *vaccines* which would encourage me to employ them in acute infections, and in chronic infections it is very difficult to judge of their value.

It is my opinion that chemotherapy, as discussed by Ehrlich,³ promises much in the treatment of infections. It is, however, still in its experimental stage.

TREATMENT OF INFECTED WOUNDS. When the wound is open and nothing further can be done from a mechanical standpoint to improve drainage; when there is still evidence of a local infection as indicated by the character of the granulation tissue, and some general infection, as manifested by fever and leukocytosis, we may find the treatment first employed by Pfannenstiel for lupus, valuable. It impresses me as the most promising among all the newer methods of wound treatment, the object of which is to combat infection.

¹ Jos. L. Miller, *Journal of the American Medical Association*, 1910, lv, 2034, and F. von Fillinger, *Deutsche med. Wochenschr.*, May 23, 1912.

² *American Journal of the Medical Sciences*, 1911, cxl, 755.

³ *Centralbl. f. Chir.*, 1910, p. 162.

Pfannenstiel's method consists in the precipitation of iodine from KI or NaI, given internally, into the infected tissues by bringing the surface of the wound in contact with dressings kept moist with hydrogen peroxide.

A. von Reuterskiöld¹ has modified the technique of Pfannenstiel for non-tuberculous lesions, and established the most effective dosage. The H_2O_2 is the commercial 3 per cent. solution, and should be slightly acidified with acetic acid. About one and one-half hours after the first administration of KI by mouth, continuous irrigation of the wound is arranged for in the following manner:

Two bottles of about 8 ounce contents are provided with rubber tubes through which a slightly moistened cotton wick has been drawn so as to protrude at both ends. One of the bottles is filled with H_2O_2 solution, and is placed above the level of the wound; the other bottle serves to receive the drainage and should, therefore, be placed below the level of the wound.

The wound is now carefully lined with a piece of gauze moist with the solution so that it is everywhere in intimate contact with the base and walls of the wound. Over this is spread the wick from the supplying bottle; over this a layer of thin gauze; over this a small piece of rubber tissue smaller in circumference than the wound; then again some gauze, followed by the wick of the draining bottle; over this gauze sufficient to fill the remainder of the wound cavity to the surface, and over all protective rubber tissue. The skin about the wound is covered with a thick layer of lanolin to the borders of the wound, and the protective is made air-tight with lanolin spread over its edges. Both tubes, of course, pass through the protective, the connection is made air-tight with some of the rubber dissolved in a few drops of chloroform, and placed about the openings in the protective.

The daily dose of KI is divided into four parts as follows: One-third, one-sixth, one-sixth, and one-third of the total quantity at intervals of three hours during the day.

The normal combination is as follows: 3 grams (45 grains) of KI daily by mouth in doses as above, and continuous irrigation of the wound with 3 per cent. hydrogen peroxide containing 1 per cent. of acetic acid. Doses proportionately smaller than this act more slowly and superficially. After an ulcer or a wound has become clean under the above normal dosage, epithelization and healing progress more rapidly with smaller doses, say, 2 grams (30 grains) KI and 2 per cent. H_2O_2 , with 0.5 per cent. of acetic acid; and, still later, 1 gram (15 grains) KI, with 1 per cent. H_2O_2 containing 0.25 per cent. of acetic acid.

The progress of healing may be still more hastened by skin-grafting and the combination of KI with irrigation last named (1 gram KI,

¹ Archiv f. klin. Chir., 1912, xcviii, 796.

1 per cent. H_2O_2 , and 0.25 per cent. acetic acid). When the patient shows signs of gastric disturbances due to the administration of KI, the drug may be given in the same doses per rectum.

Pfannenstiel has used the method for tubercular lesions of the skin, lupus, etc. Reuterskioeld has successfully employed it for acute and chronic leg ulcers; infected wounds contaminated with impurities, pus, bacteria, etc.; for acute and chronic empyema. He has also modified the method for employment in the dispensary for felons and other infected lesions which ordinarily do not require the patient's admission to the hospital.

For ambulatory treatment, the bottles used are flat and fastened to the skin of the patient above and below the wound with adhesive straps.

TUMORS

In this volume of *PROGRESSIVE MEDICINE* I have attempted to present the literature, as it has accumulated, and my own experience and investigations on this most important chapter in surgery. I have again and again referred to the fact that we have no efficacious treatment for malignant disease when it has become disseminated. The only possible hope of a cure is when the disease is still local and can be completely eradicated with the knife. Radium and x -rays have but a limited field, and, as far as my experiences and investigations have gone, any malignant disease cured by radium or x -rays could have been eradicated, with less danger of a recurrence, by excision. The serum of streptococcus and *Bacillus prodigiosus* (Coley's serum) seems to have accomplished some results in sarcoma which have extended locally beyond the possibility of excision with the knife. I will discuss this more in detail later.

PRECANCEROUS LESIONS. Fortunately, the early contributions on the so-called precancerous lesions are beginning to have a good effect. I am surprised to find how rapidly this knowledge is being disseminated and understood by the laity. The profession at large is also becoming interested and is on the lookout for these innocent lesions which may later give rise to the most malignant tumors.

Some pathologists object to the term "precancerous lesion." I am willing to admit that it is not scientifically accurate, but I know of no term which can compare with this for its psychological effect. Only when we call such lesions "precancerous" and emphasize the danger of the later development of a malignant tumor which may demand a mutilating operation, in which the probabilities of a cure are on the average less than 40 per cent., can we expect to stimulate the interest of the laity and the profession in them. It is my opinion that today we have the facts to demonstrate that these lesions, for practical

purposes, are precancerous. The surgeons have had these facts for many years, but apparently they have remained outside their field of vision. It is only recently that they have begun to realize their importance. As a matter of fact, even today the literature on this subject is relatively small. It requires an unusually careful history and very numerous records to bring out the fact in such a light that the proper impression is made upon the people and the profession.

Fortunately for myself, I have been accumulating such facts in the last nineteen years in the Surgical Pathological Laboratory of the Johns Hopkins Hospital and University. It is only in the last four or five years that we have made a critical investigation as to the precancerous lesions in every case of malignant tumor. These records are of cases treated in the clinic of Prof. Halsted, of the Johns Hopkins Hospital, from other hospitals in Baltimore, and, due to my interest in the subject, from cases sent me by colleagues and former students.

I have presented this subject before in *PROGRESSIVE MEDICINE*, and have also published on it extensively elsewhere. I will refer to the recent literature shortly.

It is my opinion that most of the operative work by a surgeon for malignant tumors is unnecessary in the sense that the operation is performed at too late a period. In this period the operation, as a rule, is more extensive, often mutilating, frequently associated with a higher mortality, usually with a longer and more uncomfortable convalescence, never with the same probability of a cure.

Why should women wait weeks, months, and years after they feel a lump in the breast? The indication for treatment begins the moment the lump is felt. It is, therefore, simply a matter of education of the laity and the profession.

In the skin the precancerous lesions are: Different types of warts, or areas of hypertrophy of the epidermis called keratosis; chronic ulcers and certain skin lesions like tuberculosis, syphilis, etc. Now, in those cases in which the lesion is single on the skin, or when there are only one or two lesions, the radical and immediate removal by excision and suture is a simple affair, and the laity and the profession must be educated to this view. Epidermal defects and hypertrophies must be eradicated. When the lesions are multiple, as in psoriasis, arsenical and lead keratosis, multiple keratosis from exposure to the sun, the individual must be educated to report at once any change in the local condition of any one of these lesions to his physician, and this local area should be excised.

I have previously stated in these pages that in all cancers of the skin of which I have records, in every case in which the record is complete, a precancerous lesion was present. Cancer never begins in the normal skin. There is a wart, a subepidermal nodule, a keratosis, an eczema, a psoriasis; an ulcer, simple, tubercular, or syphilitic. The

duration of the precancerous lesion varies. As a rule, when the lesion is in the epidermis of the skin, the period is much longer than when it is situated on the mucocutaneous border of the lower lip, or on the epidermis, cheek or tonsil.

These precancerous lesions of the skin rarely give discomfort. It is not until they ulcerate and form fungous or excavated ulcers that the individual seeks help.

The danger of delay is much greater when the lesion is situated on the skin and mucous membrane. The moment the epithelial growth becomes malignant it rapidly infiltrates the floor of the mouth or the tongue, and extends to the glands of the neck from the lip. The operative results of the late stage of cancer of the tongue are too awful to contemplate. Fortunately, in the last two years I have had as many cases of precancerous lesions of the tongue as of distinctly malignant tumors, while previous to that the records showed 85 cases of cancer with only 4 in the precancerous stage.

When this little precancerous lesion is situated on the skin and the mucous membrane accessible to inspection, there is no difficulty whatever in its recognition. Again it may be stated that in the future, to get all of these cases for treatment in the curable stage, is simply a matter of education.

The old saying, "Where ignorance is bliss, it is folly to be wise," cannot be applied here, but when the patients come for treatment in the late stage of cancer, he who is ignorant of the results of operative treatment is truly blissful.

The papers read and the discussions of the Second International Conference for the Study of Cancer¹ have been published. This conference took place in October, 1910. The published transactions cover about 800 pages. The review² states that it is a most comprehensive collection of papers and discussions—a book which everyone interested in the study of cancer should have.

I have carefully followed the literature on tumors and I have carefully re-studied all the cases of tumors recorded in the surgical pathological laboratory. I am impressed with the fact that, from a practical standpoint, this investigation of the precancerous lesion offers more than anything else just now, to bring about a decided improvement in the number of cures of cancer and sarcoma, and the number of such cures without mutilation.

Theilhaber³ discusses the relation of chronic inflammation, scars, trauma, and processes of proliferation to the causation of tumors.

Porter and White,⁴ of Boston, discuss the development of carcinoma in x-ray keratosis. Schamberg⁵ reports on carcinoma developing in

¹ Paris, Felix Elkan, 1911.

² *Centralbl. f. Chir.*, 1912, p. 112.

³ *Ibid.*, p. 677.

⁴ *Annals of Surgery*, November, 1907, p. 649.

⁵ *Journal of Cutaneous Diseases*, January, 1907.

the keratosis of the skin following arsenic. I have observed 3 such cases. Dubreuilh and Petges,¹ Klose and Vogt,² Poncet and Leriche,³ all report cases of carcinoma developing in tuberculosis. Rehn⁴ gives a very extensive contribution on the relation of external irritation to carcinoma. Bashford,⁵ who has studied the question chiefly from an experimental standpoint, comes to the conclusion that at the present time responsibility for the cure of cancer rests with the general practitioner who should educate his patients with regard to the precancerous lesions, look for them himself, and urge their prompt removal. G. Lenthal Cheatle,⁶ of London, has been publishing on this question for a number of years. In his first paper he calls attention to the localization of cancer of the skin, especially of the face, in certain areas corresponding to the zones of definite peripheral nerves, in the second paper to the relation of cancer to leuko- and scleroderma. In the third paper he calls attention to the development of cancer in senile keratosis.

Trauma. Coley⁷ considers most extensively this subject, and gives many illustrations. Many cases are reported, and there is a full bibliography, with the conclusion that there is a distinct relation between trauma and malignant new formation. Leon Berard⁸ deals with the same subject.

I shall discuss this point again under sarcoma.

Microscopic Diagnosis. When surgeons begin to see malignant tumors in their earliest stage, or in the stage which we may call precancerous, the clinical diagnosis will usually be very difficult, and, in many cases, impossible. In this stage more will depend upon the histological investigation. This subject cannot be entered into this year, but its importance will increase when the public and the profession answer this call for the treatment of the precancerous lesion. I am now preparing a paper on borderline pathological processes, and this subject, with the literature, I hope to be able to present next year.

Epithelial Tumors. I introduced this subject in *PROGRESSIVE MEDICINE* for December, 1904 (p. 134). At that time I gave a classification with illustrations, gross and microscopic, of the various types. Since then I have presented the literature, and each year my own accumulating experience, with illustrations. This year I have little to add, except on the importance of the precancerous lesion. This is specially great in epithelial tumors, and when the seat of the disease is the skin of the lower or upper extremity, the duration of the benign precancerous lesion is long. There is, therefore, ample opportunity for its removal.

¹ Centralbl. f. Chir., 1910, p. 372.

² Beitr. z. klin. Chir., 1910, lxvi, 1.

³ Révue de Chir., February, 1912, p. 153.

⁴ Beitr. z. klin. Chir., 1910, lxvi, 147.

⁵ Practitioner, March, 1911.

⁶ British Medical Journal, December 12, 1903; *ibid.*, April 25, 1905; *ibid.*, June 12, 1909.

⁷ Annals of Surgery, April and May, 1911.

⁸ Centralbl. f. Chir., 1912, p. 113.

Hans Burekhardt¹ presents, with gross and microscopic illustrations, some very interesting benign epithelial tumors of the skin, and discusses the entire question of the benign hypertrophy of the epidermis. It is in this period that we should take the greatest interest.

A. Vecchi,² in his report of 6 cases of carcinoma basocellulare of the skin, reminds us of the splendid contribution of Krompécher, which I discussed in 1904. His conclusions that surgery is the only treatment is an important one, because this is the type of epithelial tumor which has been subjected most to treatment with *x*-ray and radium. It is my opinion that *x*-rays and radium are blocking progress in the treatment of cancer. This view is also taken by Koerbl³ from von Eiselsberg's clinic, who calls attention to the frequent recurrences after the apparent cure of relatively benign basal-celled epitheliomas. His experience leads him to the conclusion that *x*-ray treatment is dangerous, because the recurrence is more malignant than the original tumor, and the cases at all suitable for treatment with *x*-rays are those in which the lesion can be easily and completely excised.

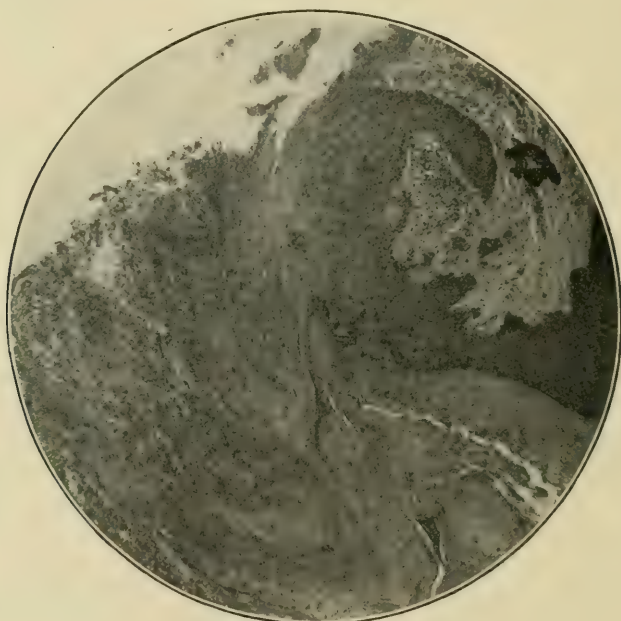


FIG. 21

EPITHELIAL TUMORS OF THE UPPER EXTREMITY. Among 49 cases of which I have records, there are no subepidermal nodules; 20 cases belong to the type of benign warts, and all of these patients have remained well since local excision. In seven instances the warts were

¹ Beitr. z. klin. Chir., 1910, lxi, 795.

² Centralbl. f. Chir., 1911, p. 605.

³ Archiv f. klin. Chir., 1912, xcvi, 752.

histologically malignant, in everyone with a previous history of a benign wart. Histologically, they were all spinocellular epitheliomas. As compared with the benign wart, the surface of these malignant warts showed ulceration. Microscopically, at the base in places the basement membrane had been destroyed and the epithelial cells had broken through and were invading the subepidermal stroma. Fig. 21 illustrates such a picture. The patient was aged sixty-five years, and had observed a hornified wart on the dorsum of the hand six months. There was a little weeping from the surface, the base was slightly indurated. There has been no evidence of recurrence or glandular involvement three and one-half years after the local removal.

In none of these 7 cases were the glands in the axilla removed. In the 4 cases in which we know the results, there have been no local recurrences and no evidence of metastasis to the neighboring lymphatics. From these records we may state that in the malignant wart of the upper extremity a local operation is sufficient.

Basal-cell epitheliomas are apparently rare here—we have but 3 cases. One of these developed in a subepidermal nodule; the patient was aged seventy-one years, and had had the small nodule on the skin of the ring finger for many years; there had been ulceration during the last ten years, gradually involving the entire finger; the finger was amputated. This patient returned in three years with diffuse involvement of the lymphatics of the arm and axilla, and died from general metastasis some months after a shoulder-joint amputation. Although in the original tumor I could find no evidence of spindle-cell infiltration, the metastatic lesions were those of a spindle-cell tumor. This case illustrates the importance of the early removal of the apparently innocent subepidermal nodule.

The second basal-cell tumor originated in an area of keratosis on the back of the hand, in a man aged seventy-two years. For at least four years there was a small area of keratosis not larger than a 10-cent piece covered with a scab. This would have been the proper time for its removal. In the following year the ulcer extended until it had reached the size of 10 by 12 cm., involving the hand and forearm. This patient remained well two years after amputation. The short period of freedom from recurrence is no evidence of a cure.

The third case of this tumor arose in an ulcer secondary to an unhealed wound. The injury had been acquired two years before operation, and the ulcer at the base of the little finger had never healed. The result after amputation of the finger was local recurrence and death—apparently the amputation was not sufficiently remote from the ulcer.

I have never seen a cubocellular epithelioma on the upper extremity.

The spindle-cell tumor is the most malignant. In all of the 18 cases there was a distinct precancerous lesion. In 10 of these there was a distinct history of a benign wart, of months' or years' duration, which

later ulcerated, forming an excavated ulcer or a fungus. In 4 cases the malignant tumor developed in a chronic ulcer secondary to a burn. In all of these cases there was ample opportunity for the cure of the ulcer in the benign stage. In the remaining 4 cases, the cancer developed in an ulcer from an unhealed wound.

The ultimate results in this group of cases demonstrate that in the fully developed cancer of the spindle-cell type arising in the skin of the upper extremity, in addition to the local excision of the growth, the glands in the axilla should be removed. In these 18 cases there is but one permanent cure following the local operation only. This patient remained well nine years after an amputation of the arm for a fungous carcinoma on the dorsum of the hand. In only 2 cases were the glands in the axilla removed at the primary operation on the local growth. These two patients have remained well five and three years respectively, although the glands showed metastasis. The remaining cases have either been lost track of, or have returned with hopeless axillary involvement. In one case there was apparent freedom from all signs of axillary involvement for three years after local excision. When he came under observation four months later the axillary condition was inoperable.

EPITHELIAL TUMORS OF THE LOWER EXTREMITY. The total number of epithelial tumors of the lower extremity of which I have records is 42, a little less than in the upper extremity. There are 13 benign warts, many of them ordinary corns. Fig. 22 is a good example of the gross appearance of a benign wart. It was situated on the sole of the foot, was of seven months' duration in a boy, aged fourteen years, and had originated in a wound. There are 3 examples of the malignant wart which have remained well since local excision. Of the 5 basal-cell carcinomas, 3 originated in subepidermal nodules, 1 in the ulcer after a burn, and 1 in the ulcer of a wound. Although I have never observed the cubocellular tumor to arise in the skin of the upper extremity, we have noted 4 in the lower extremity. This cubocellular tumor is composed of transitional epithelium. The most common situation is the urinary bladder. One of these tumors developed in a post-typhoid bed-sore situated on the thigh. This patient has remained well three years and eight months after local excision.

This is my first observation of a malignant epithelial tumor developing in a bed-sore. The duration of the disease had been seven months in a male, aged thirty-four years.

In a second case the cancer developed in an area of keratosis in the skin over the left groin. In five years there developed an ulcer 11 by 5 cm. In spite of extensive local excision with removal of the underlying glands of the groin, the patient died of local recurrence in one year and five months.

The other two cases have been lost track of.

The critical study of the 17 cases of spinocellular tumors brings out the same conclusions as those from our cases on the upper extremity. In every instance there was a history of a precancerous lesion which



FIG. 22



FIG. 23

had been neglected. In addition, we find in this group cancer developing in sinuses of chronic osteomyelitis. For this tumor on the lower extremity the glands of the groin should also be removed as a routine procedure.

Fig. 23 is a good example of the ordinary histological appearance of the carcinoma spinocellulare. This patient, a male, aged sixty-five

years, injured the dorsum of the foot with a piece of copper three years and five months before operation; the scar frequently ulcerated; three months before operation a warty growth developed in the scar, which at the operation was a typical spinal-cell fungus. The patient remained well five years after the local excision.



FIG. 24

It is often very difficult, in the gross appearance and even histologically, to distinguish atypical overgrowth of epithelium in chronic ulcers from the malignant tumor. Fig. 24 is a good illustration of this condition. The photograph shows the ulcer over the external malleolus of the foot. In addition to this ulcer, this and the other extremity were covered with numerous punched-out ulcers quite typical of the syphilitic lesion. Only this one ulcer showed an epithelial overgrowth. All the ulcers had been present about three months, and the patient's blood gave a positive Wassermann test. This apparently cancerous ulcer and all the others healed perfectly after two intravenous injections of salvarsan. The microscopic study of a section from the ulcer shown in the photograph demonstrates marked hypertrophy of the epithelium; the epithelial papillary body invades deeply the cellular granulation tissue; in places the basement membrane is lost, and there is direct growth of the epithelial cells into the subepidermal granulation tissue.

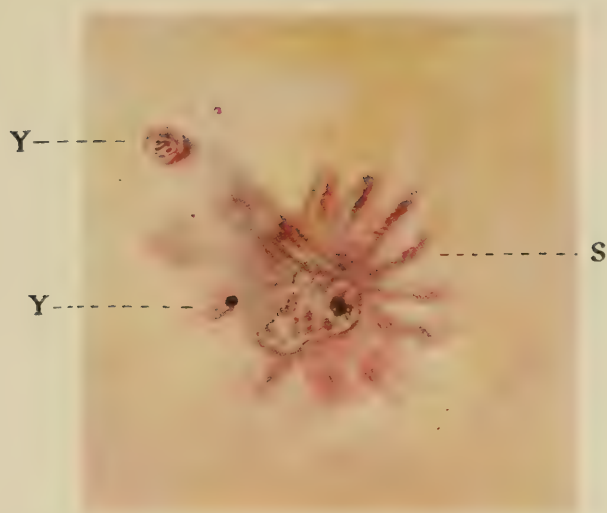


Fig. 25



Fig. 26

I have observed this before in tuberculosis of the skin, in the epidermis about blastomycetic lesions, and in *x*-ray keratosis. It is an example of one of those borderline pathological processes in which one must not be influenced entirely by the microscopic study. In this case, if the ulcer had not healed rapidly under salvarsan treatment, complete excision would have been indicated.

EPITHELIAL TUMORS OF THE SKIN OVER THE TRUNK. Apparently the skin over the trunk is less frequently involved by malignant epithelioma than the skin over the extremities, neck, or face. I have records of but 15 cases. Of these 4 were benign warts, 1 a malignant wart, 5 basal-cell tumors. In every one of these cases the precancerous lesion was a subepidermal nodule. There are 2 examples of the cubocellular epithelioma. In one of these cases the precancerous lesion was an area of arsenical keratosis, the other a small area of eczema. The more malignant spinocellular tumor is also less frequent here. I have observed but 3 cases. In one of these the precancerous lesion was a syphilitic ulcer on the perineum near the anus with metastasis to the glands in both groins. In the second case the cancer developed in an area of arsenical keratosis.

I wish to emphasize here in reporting this case the development cancer in one of many skin lesions on the same individual. The lesion may be psoriasis, ordinary eczema, syphilitic eczema, or keratosis associated with lead and arsenic.

Pathol. No. 11322. This patient, a white male, aged fifty years, had suffered from acne from the age of twelve years to thirty-five years. There was apparent freedom for seven years, and then a recurrence. At that time, eight years ago, he began to take arsenic in the form of Fowler's solution. He took from 5 to 8 drops a day for eighteen months. The acne disappeared. Six months later, that is six years ago, there began to appear in different areas on his skin a peculiar scaly lesion somewhat like psoriasis. The largest patch was on the right buttock. After this patch had been present five years it was curetted. The typical lesion, however, returned in the scar within a few months. About six months before operation the scaly patch on the buttock became elevated, and the surface ulcerated. This change did not take place in any other lesion. At the end of two months the lesion on the buttock was excised by his physician and the tissue sent to me. It proved to be a carcinoma spinocellulare, and was apparently incompletely removed. The patient then came under my observation in April, 1911, two months after the local operation. Fig. 25 shows the scar of the operation with an ulcer in the centre (*s*); the two small lesions (*y*) represent the arsenical keratosis. The entire area was widely excised with skin, fat, and muscle. The microscopic study demonstrated that the ulcer was a carcinoma cubocellulare, and there was infiltration as deep as the muscle fascia. This patient had

numerous other areas of keratosis. Fig. 26 illustrates well the gross appearance of such an area. Microscopically, there is epidermal hypertrophy with great hornification of the surface, downgrowth of the epithelial papillæ, but at every point the basement membrane and layer of basal cells are intact.

This observation, therefore, demonstrates the importance of the immediate removal of such areas, if any change is observed. I have so far removed about 10 of the larger areas from this individual. One of these removed from the lobe of the ear shows beginning malignant change.

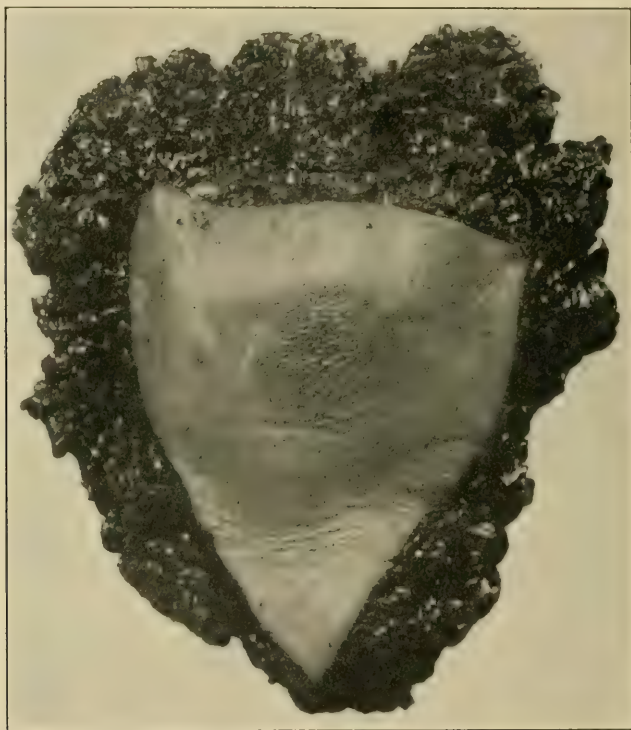


FIG. 27

The great importance of removing the neighboring lymphatic glands in carcinoma of the skin of the cubocellular and spinocellular type is illustrated in this case. I have just discussed this question in relation to tumors of the upper and lower extremity. I did not remove them, as I should have, at the primary operation on this individual. He returned in March, 1912, eleven months after his operation, with extensive involvement of the glands of the right groin. The malignant lesion had been situated on the skin over the right buttock. The patient had observed the first gland three months ago. The glands

have grown rapidly, and the skin over an area about the size of a silver dollar was adherent to the growth beneath.

In this instance I followed a new method which I have practised on a number of occasions for the dissection of the glands and tissues in the groin for malignant disease. The skin over the gland is left attached; flaps of skin from this area are dissected back, leaving a wider area of



FIG. 28

subcutaneous fat; then the incision is carried through the fat to the fascia of the muscle; the fascia is divided and separated from the muscle; the area so denuded extends from the anterior iliac spine to the middle of the thigh over Hunter's canal, and from there along the adductors to the pubes and then along a curved line above Poupart's ligament from pubes to anterior iliac spine. This dissection leaves the femoral artery and vein absolutely exposed, their branches having been ligated close to the trunk. In extensive cases, as in the present, Poupart's ligament is removed. The defect is filled by a transplant from the sartorius muscle. Fig. 27 illustrates the skin-surface view of the tissue excised in this case, and Fig. 28 the lower surface after an incision had been made through the main growth. The thin capsule

(*p*) is Poupart's ligament which forms the boundary of the malignant disease at this point. Two weeks after this operation the granulating wound was skin-grafted. It is six months since the operation, and there is no evidence of a recurrence.

I will discuss later a similar operation in both groins for extensive cancer of the penis.

EPITHELIAL TUMORS OF THE PENIS. I wish to emphasize here the importance of the radical operation upon the glands in both groins in cancer of the penis. In going over our list of cases—about 50 in number—I cannot find a single case of a definite cure of a cancer of the penis without the glandular operation. I find a number of cases well from six to fifteen years after the amputation of the penis and complete dissection of the glands of the groin. In 1 case, the glandular operation was done two years after the local, and this man is well nine years after this second operation.

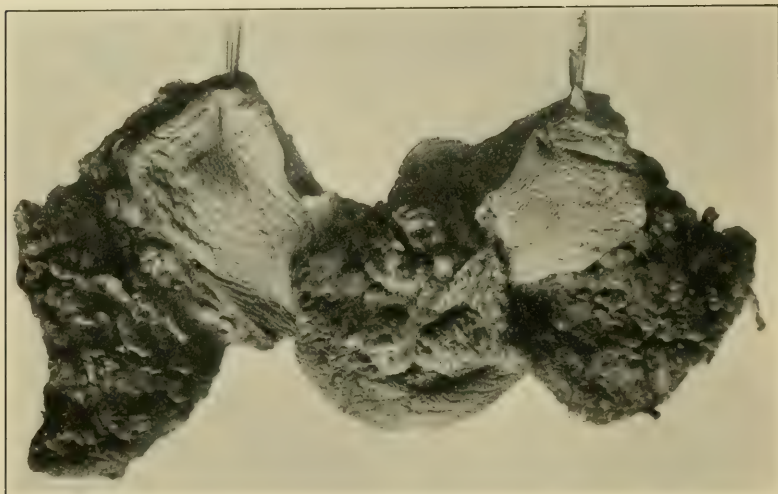


FIG. 29

These observations, therefore, support my statement.

The slight elephantiasis of the scrotum and limbs which usually follows extensive dissection of the glands of the groin rarely gives much discomfort and soon disappears.

In these cases we find a definite history of precancerous lesions—lesions which, if recognized early, could be radically removed without mutilation of the organ. Unfortunately, few cases have come under observation at this stage.

Even the more advanced cases should be given the benefit of the operation. The following case will demonstrate this:

Pathol. No. 12211. White male, aged fifty-four years. Fourteen

months before operation he observed bleeding and found a small nodule situated on the frenum between the glans penis and the prepuce. This was the time to operate. Following irritating local treatment, the nodule gradually developed into a fungous cauliflower growth. Fig. 29 illustrates the extent of the tissues removed. As the cauliflower tumor had infiltrated the body of the penis up to the pubes, it was necessary to excise the entire organ with the scrotum, and both testicles and make the huge dissection of the tissue in both groins as just described and illustrated. This patient is well and comfortable nine months since operation. Fig. 30 illustrates the present result.



FIG. 30

Benign and Malignant Pigmented Moles. The subepidermal cells which form the pigmented mole are of embryonic origin. These moles are so frequent, give so little pain or discomfort, that the majority of individuals and physicians pay little attention to them. We now know that these tumors may at any time in adult life become malignant. In this change the local growth is slight, metastasis apparently takes place immediately. Cures after this has happened are so rare that they must be looked upon as surgical curiosities.

The question is: What moles should be excised? It is my opinion that every pigmented area which projects from the surface of the skin should be removed. If this area is situated in positions frequently subjected to trauma, the indications for operation are still more imperative.

Pigmented areas situated in the region of the nails should always be excised, as in my experience these areas may give rise to metastasis without any evidence of local growth.

I have careful records of 100 cases of benign pigmented moles. Following the excision of one or more moles on such individuals we have never observed local recurrence in the scar or metastasis. In excising the pigmented mole, which can be done under local anesthesia, one should always be certain that the incision is from 3 to 5 mm. beyond the edge of the pigmented zone. The skin zone excised should be removed with a zone of subcutaneous fat.

Carbon-dioxide snow is not a proper treatment for the pigmented mole. In 4 instances in which this treatment had been employed I have later excised the scar and found nests of the congenital cells. I have observed the congenital pigmented mole but once in the negro race.

There may be local growth in the little tumor without malignant change. This, as a rule, is chiefly a growth of the subepidermal tissue of the type seen in fibroma molluscum.

When these pigmented areas become very large, the two conditions—congenital pigmented mole and fibroma molluscum—are combined. I have never seen these large tumors associated with metastasis.

In the previous numbers of *PROGRESSIVE MEDICINE*¹ I have illustrated the different types of congenital pigmented moles.

MALIGNANT PIGMENTED MOLES. I find records of about 45 cases in which the malignant tumor developed in a lesion which had been observed since birth. In about 25 instances the patients were unaware of the congenital nature of the lesion, but had observed later in life a tumor resembling the congenital mole.

I have never observed metastasis except from the elevated pigmented mole and pigmented areas in the region of the nails. As a rule, the first local change observed by the patient is a slight weeping from the surface of the mole, which is due to destruction of the thin epidermal cover. In the benign mole there is usually a narrow zone between the thin epidermis and the nests of congenital cells. In the malignant mole there is always a growth of these cells up to the derma with destruction of the epidermis in places. Except in the pigmented area in the region of the nails, I have always observed this ulceration of the epidermis due to its infiltration by the tumor cells. The duration of life, from the onset of the first local change to death from metastasis, is, on an average, two years. A number of cases have lived five years, one seven years. Dr. Wainwright, of Scranton, has one patient living now seventeen years since the first operation. This is the only apparent cure of which I have a record. There seems no doubt as to the correctness of the diagnosis in this case.

¹ December, 1903, p. 149, 151; 1907, p. 205; 1908, p. 213; 1909, p. 197.

Benign Connective-tissue Tumors. HEMANGIOMA. This tumor may be congenital or acquired, single or multiple. The most common situation is in the derma. The tendency to later develop into malignant tumors is much less frequent than in the congenital mole. For those tumors in which excision would be mutilating the proper treatment is with the carbon-dioxide snow or liquid air, or the Paquelin cautery.

When left alone, these tumors may reach a huge size, producing great deformity, and presenting almost insurmountable difficulties for the radical cure. Fig. 31 represents such a case. This patient came under observation first at the Johns Hopkins Hospital in July, 1893, when aged forty-three years. At birth he had a small flat nevus



FIG. 31

on the cheek below the left eye. There was very little growth for twelve years. During this time it could have been easily eradicated by proper treatment. When he first came under observation the tumor was very much less extensive than that shown in the illustration taken in 1912, nineteen years later. At that time there was no involvement of the left upper lip, the eye was not closed, there was no involvement of the neck. When he was first admitted the tumor was soft and compressible, and the patient could feel and, he states, hear a peculiar sound suggesting a venous hum. There is no note as to this in the previous history. The patient was treated with the Paquelin cautery during a period of three months. He failed to return after this until September, 1912. Although the tumor had in the meanwhile grown larger, he has

never, since the Paquelin treatment, felt or heard the venous hum. The tumor is less compressible and firmer. We are now attempting by the combined use of excision, the Paquelin cautery, and carbon-dioxide snow, to improve his condition.

I illustrate this case to demonstrate the dangers of leaving birth-marks alone.

The congenital nevus should be carefully watched. If it shows any evidence of local growth, treatment with carbon-dioxide snow should be begun at once, irrespective of the age of the patient. If there is no local growth, treatment should begin after the age of two or three years, and continued until a cure has been accomplished.



FIG. 32

An arteriovenous aneurysm may develop in a hemangioma. I have observed one such case. Fig. 32 shows the condition before operation in the patient, aged thirty years. At birth there was a flat nevus on the cheek below the outer corner of the right eye. It extended very slowly, but projected very little. Eight years ago this area was struck with a base-ball. There was considerable hemorrhage, followed by marked swelling. Then the patient began to observe distinct pulsation. At the examination the entire tumor pulsated. The tortuous vessels on the periphery pulsate. This patient had been treated with the Paquelin and carbon-dioxide snow without result.

I ligated the external carotid artery, and the pulsation ceased at once. Then there followed treatment with carbon-dioxide snow and the Paquelin cautery. The ligation was performed on July 30, 1912. It is now six weeks since the operation and subsequent treatment—there is no pulsation, and the lesion is flat.

The chief literature on hemangioma during the last year deals with the treatment with carbon-dioxide snow. Maurice B. Ahlborn¹ gives a simple method for making a carbon-dioxide snow pencil. Howard Fox² presents a case of the so-called “bathing-trunk” nevi.

FIBROANGIOMA. The hemangioma may increase in size, due to the hypertrophy of the connective tissue between the bloodvessels. This type of hypertrophy resembles elephantiasis. The endothelium of the blood spaces may proliferate, forming alveoli of endothelial cells. Clinically, the lesion may simulate sarcoma. When the tumor is cut into, the dark, black areas scattered in the white stroma suggest melanotic sarcoma, and, when frozen sections are made, a diagnosis of endothelioma is suggested. I am confident that a number of cures of so-called alveolar pigmented sarcomas reported from time to time in the literature belong to this benign type. I have observed 10 cases. In every case, upon examining the gross specimen, I found areas of spongy red tissue characteristic of hemangioma. These areas are never present in sarcoma. All of these ten cases are well. In many incomplete operations were performed. From a practical standpoint, surgeons should bear in mind this benign lesion, because, if a diagnosis of sarcoma is made it may lead to a mutilating operation. Four of our cases were situated on the extremities, and if a mistaken diagnosis had been made, amputation would have been performed. I have discussed these cases, with illustrations, in previous numbers of *PROGRESSIVE MEDICINE*.³

INTERMUSCULAR HEMANGIOMA. I have records of 9 cases. In 2 the lesion was situated in the muscles of the thigh; in 2 in the muscles of the leg; in 2 in the muscles of the forearm, in 3 in the masseter muscle of the cheek. These tumors are always compressible. When situated in the muscles of the extremities the swelling increases when the limb hangs. Mistakes have been made in the diagnosis. When the lesion was present in the muscles of the calf the pain in the leg and contraction of the gastrocnemius have led to tenotomy of the tendo Achillis, or the use of a plate for flat-foot. When situated in the muscles of the thigh, contraction at the knee-joint has influenced the surgeon to attack this joint. When situated in the forearm, the diagnosis of tubercular synovitis has been made. Fig. 33 shows the swelling at X just above the external malleolus. The patient was a white male,

¹ Journal of American Medical Association, 1912, lviii, 1009.

² Ibid., p. 1190.

³ December, 1903, p. 154; 1907, p. 206.

aged thirty-eight years; for eight years he has had pain in the calf and lower third of the right leg, which is more marked on standing and walking. The swelling has been observed about six years. It is compressible, and disappears when the leg is elevated. At the operation in August, 1912, I found a group of dilated veins in the subcutaneous fat in the position of the swelling. These communicated with the muscle belly of the flexor longus digitorum, which was involved in the angiomatous condition. The entire vascular lesion was excised.

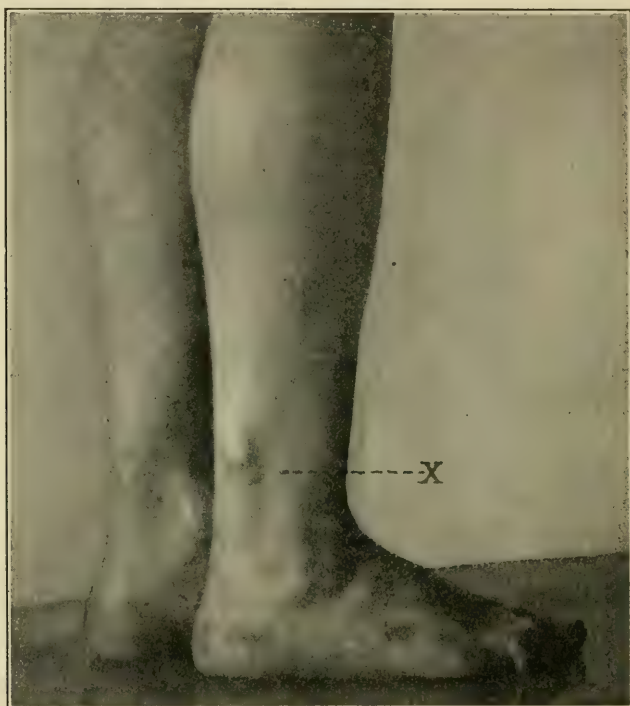


FIG. 33

In some cases complete excision would destroy too much muscle. In such instances partial excision combined with the use of the Paquelin cautery and gauze packing, will accomplish a cure with less destruction of muscle function.

I have previously presented the literature on this subject in the December numbers of *PROGRESSIVE MEDICINE*.¹

GRANULATION-TISSUE TUMORS. A subepidermal or subcutaneous angioma may ulcerate after trauma and give rise to a fungous tumor which may be mistaken for sarcoma. I have records of 10 such cases. The age of onset varied from 9 to 25 years. In none was the tumor

¹ 1903, p. 184; 1905, p. 242; 1908, p. 177.

observed to be of congenital origin. The duration of the tumor has varied from two weeks to three months. It was situated near the nail in 3 cases, on the palm of the hand in 3 cases, on the skin of the finger in 1 case, and in the axilla and neck in 1 case each. In 5 of these cases the tissue was sent to me with a diagnosis of sarcoma. The histological picture is that of vascular granulation tissue, but, in addition, there are larger endothelium-lined spaces than one finds in granulation tissue without the previous presence of an angioma.

LYMPHANGIOMA. These tumors are much less frequent than the hemangioma. I have observed 11 cases. They appear as small lesions of the skin or subcutaneous tissue with, frequently, a history of injury. Fig. 34 represents the usual gross appearance. This patient was a

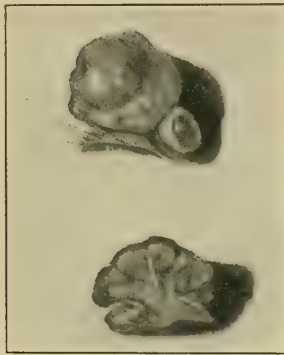


FIG. 34

white female, aged sixteen years; the tumor, situated on the occipital area of the scalp, had been present two months; on the top the epidermis had disappeared, leaving superficial ulceration. Histologically the tumor differs from capillary hemangioma in the absence of blood in the endothelium-lined spaces. When the lymph spaces are plugged with proliferating endothelial cells we get a picture of endotheliomil suggesting malignancy. Fig. 35 is an example of such a histological picture. In addition, the tumor is of great interest because it contained areas of calcification. The patient was a colored male, aged forty-seven years. Fifteen years before operation he observed, in the region of the right trochanter, a subepidermal nodule of the size of a pea. At the operation it was 3 cm. in diameter. It was a distinctly encapsulated tumor situated between the skin and fascia lata. There has been no recurrence for three years since complete excision of the growth.

I call attention to these little tumors, because I am confident that they may be precancerous lesions, examples of which I will quote later under sarcoma of the skin and soft parts.

LYMPHANGIOMA CIRCUMSCRIPTUM. This lesion is characterized by papillary hypertrophy of the epidermis. In *PROGRESSIVE MEDICINE*

for December, 1904, p. 144, Fig. 17; 1909, p. 200, Fig. 27, I have reported and illustrated such a case. The lesion was situated on the outer side of the right thigh. In March, 1900, I completely excised this large area and closed the defect with a skin-graft. I saw this patient in July, 1912, twelve years later. There is no evidence of recurrence. Recently (Fig. 36) I have seen a similar but very much smaller area situated on the middle of the dorsum of the tongue of a child, aged three years. The lesion developed two years after birth. It was easily excised.

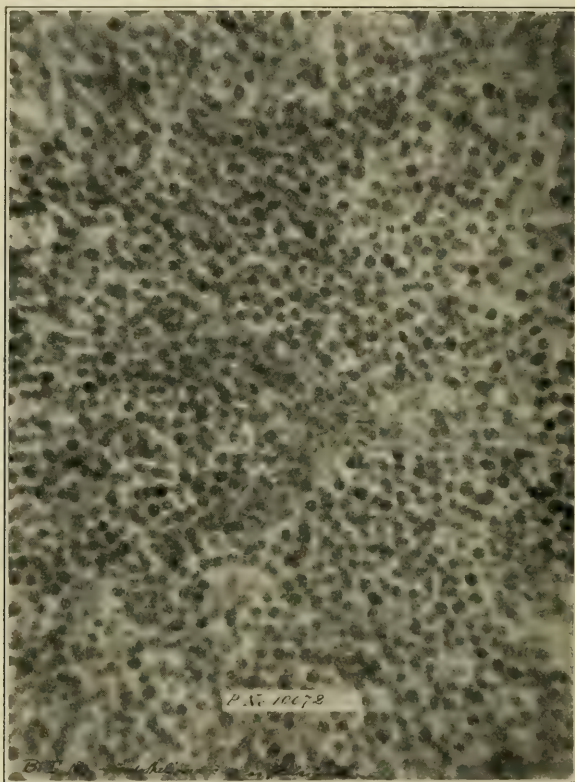


FIG. 35

Histologically the hypertrophy of the epidermis over the elephantiasis in the subepidermal tissue may show, in places, destruction of the basement membrane and layers of basal-epithelial cells with invasion of the connective tissue by the transitional and spinal cells, giving a picture of malignancy. I have called attention to this fact before, in the discussion of epithelial tumors. I have observed it in tuberculosis and syphilis of the skin, in *x-ray* keratosis, and here we find it again in lymphangioma circumscriptum. Surgeons and pathologists should familiarize themselves with the atypical down-growth of the

epidermis in chronic inflammatory lesions, and not base their diagnosis on the histological picture only.



FIG. 36



FIG. 37

ELEPHANTIASIS. This is often a lesion due to neglect. The elephantiasis associated with chronic leg ulcer is a good example. Improperly treated wounds of the axilla and groin also furnish cases. Fig. 37 shows the elephantiasis of the left leg secondary to phlebitis and a huge chronic ulcer. The beginning of the trouble is illustrated in the right leg—here there is a varicose condition of the limb with areas of phlebitis shown at X. This patient is a female, aged fifty-three years. The onset of the trouble began twelve years ago with an attack of inflammation of the varicose veins of the left leg. Due to failure to treat the condition, an ulcer developed, which has gradually increased to the present size. The condition now present in the right leg resembles the beginning of the trouble in the left. This ulcer had a wide zone of indurated skin beyond it, its surface was covered with islands of epithelium, suggesting possible beginning malignancy. I felt quite certain that complete excision, with skin-grafting, would be an operation of some magnitude, and even if successful, the period of disability would be longer. The patient preferred amputation. September 10, 1912, a Gritti amputation of the knee-joint was performed. The wound has healed *per primam*.

After the removal of the leg I excised the ulcer from the specimen. Its fibrous base was 2.5 cm. in thickness; huge dilated veins surrounded the ulcer on all sides. I am quite confident from this finding that the operation would have been a very serious one. Later I propose to ligate and excise the varicose veins of the right leg and teach the patient how to keep this leg bandaged until all swelling has disappeared. I shall also ligate and partially excise the dilated saphenous vein in the left thigh.

I think this case demonstrates what may happen in varicose veins when treatment is neglected or improper.

Figs. 38 and 39 illustrate two views of elephantiasis of the left arm. It was associated with complete paralysis. This patient, a white male, aged about twenty years, eighteen months ago received a bullet wound in the region of the left shoulder; directly following the injury there were no symptoms—he had good use of the arm, and there was no swelling. Apparently a deep hematoma developed, then signs of infection appeared, with later spontaneous rupture of the pus at many points (Fig. 39). About ten days before the rupture of the abscess paralysis developed, later the elephantiasis. There is no doubt that proper treatment in the stage of the hematoma or early in the abscess formation would have prevented the resultant distressing mutilation. In April, 1912, I exposed the axillary artery and vein, and the brachial plexus below the clavicle. It was a most difficult operation, which on account of oozing from the scar tissue, had to be performed in two stages. Both pectoral muscles were replaced by scar tissue; the vessels and plexus in the axilla were matted together with scar tissue. Since



FIG. 38



FIG. 39

the operation much of the swelling has disappeared, some sensation has returned, and the patient has slight power of the shoulder-girdle muscles, and a little in the biceps and triceps.

Lanz¹ reports on a modification of Handley's treatment for elephantiasis.²

FIBROMA. This tumor is chiefly of interest from the fact that it may become sarcoma. I am convinced that it should be looked upon as a precancerous lesion, and removed. In the discussion of sarcoma of the skin and soft parts, I shall be able to present examples of sarcoma which have developed in fibroma. The fibroma may present itself as a



FIG. 40

subepidermal nodule, or a subcutaneous tumor. It is rarely congenital. In my list of 28 cases, only 1 was of congenital origin. There is frequently a history of trauma, especially a prick with a needle, or the sting by an insect, or an infection of a hair follicle or gland. The tumors are usually small, but now and then they may reach great size. When first observed they are always small, and can be easily and completely excised without deformity. Rarely is there any change in the epidermis over the tumor; redness and beginning ulceration are suggestive, but not positive, of a malignant change. It is impossible to distinguish clinically between a subepidermal fibroma and the

¹ *Centralbl. f. Chir.*, 1911, p. 3; 1912, p. 995.

² *PROGRESSIVE MEDICINE*, December, 1909, p. 200.

so-called butchers' tubercle. The tuberculosis is only brought to light at the microscopic examination. In the older literature a diagnosis of tubercle was apparently frequently made, but since more careful microscopic investigation it has been found that the subepidermal nodule is rarely tubercular. I have seen but 2 cases. Fig. 40 shows such a tubercle before its removal from the dorsum of the hand of a pathologist.

These fibromas often present, histologically, a very cellular appearance, making the differential diagnosis from sarcoma rather difficult. But when they are properly and completely excised, there will be no recurrence no matter what diagnosis is made. The most important fact to be emphasized is that they should be excised.

Fibroma of Tendon-sheaths. A practical knowledge of these tumors is of greater importance because of their situation near the tendon. If these little nodules attached to tendon sheaths were malignant tumors, they would recur after the usual local removal. In only 2 of the 23 cases of which I have records, sarcoma developed, and these patients presented the clinical picture of sarcoma when they came under observation. In both instances, however, there was a clear history of a small pea-sized tumor near the tendon sheath for many years, which had begun to grow after a trauma. These little fibromas of the tendon sheaths should always be excised, and if they are seen in the early stage, the excision can be accomplished without injury to the tendon. Microscopically they are usually very cellular tumors and often contain many giant cells of the foreign-body type, with areas of hemorrhage suggesting a traumatic etiological factor.

George Woolsey¹ presents a very interesting case of fibroma situated in the popliteal space, in which the first symptom was stiffness of the knee two years before operation; then the mass became palpable one year later. The tumor was quite deep, because at the first exploratory operation, made nine months before Dr. Woolsey saw the patient, the tumor was not reached. Apparently only the fat had been removed. Woolsey found the tumor deeply situated, quite adherent to the vessels. In order to remove the tumor without danger to these vessels, it was divided into three segments.

KELOIDS. I have little to add to my previous discussion of this subepidermal scar-tissue tumor. Up to the present time, I have never observed a sarcoma to develop in a true cicatricial keloid. I have records of 46 carefully investigated cases. The keloid in the scar should be let alone during the active period of growth. Later, if it does not tend to disappear and still gives discomfort, or is unsightly, it may be excised, with a fair chance of no recurrence taking place.

¹ Annals of Surgery, 1912, lv, 447.

FIBROMYXOMA. This tumor probably always arises from nerve-sheaths. I have observed the lesion as a single tumor in 19 cases, and as a multiple lesion (of the type of fibroma molluscum) in 10 cases. The single tumor apparently has a greater tendency to become malignant than one of multiple tumors. The subepidermal fibromyxoma is less apt to become malignant than the subcutaneous, but, as I will show later under sarcoma of the soft parts, this tumor of the nerve-sheath must be looked upon as a precancerous lesion. As long as it is a small subcutaneous nodule situated on an important sensory or motor nerve, there is no indication for its removal. Experience has shown that the malignant tumor is always large, so there is no danger from leaving the smaller quiescent nodule alone. The moment, however, the patient observes growth, it should be excised. I have such a nodule on one of the cutaneous nerves in my own arm. It has never shown increase in size since I first observed it ten years ago. Should this nodule begin to grow, I will immediately have it removed.

The subepidermal type, when single, should always be removed. If there are multiple lesions, the larger ones should be removed, and any of the others when they show a tendency to grow.

In the larger fibromyxoma it is often very difficult to distinguish, microscopically, the benign from the malignant. The benign tumor often has very cellular areas; the malignant tumor, even when it grows to a large size, remains encapsulated. The majority of cases remain well after local excision, but as a number of the malignant have died of metastasis, the importance of removing the tumor when it is first observed, or on the first increase in size, is obvious.

Now and then the smaller benign tumor has been diagnosticated sarcoma. In April, 1910, Dr. Lemon, of Milwaukee, Wis., sent me sections from a tumor removed from the sternocleidomastoid muscle of a male, aged thirty-seven years—a small, hard swelling observed in the muscle two months. At the operation the area was about the size of an English walnut; the tumor was not encapsulated. A diagnosis of sarcoma was made from the microscopic section. The section which I examined showed that the tumor had no capsule, but there was a definite line of demarcation between muscle and tumor. The muscle showed the degeneration due to pressure. The tumor was chiefly myxomatous, but there were considerable fibrous tissue and spindle-cell areas; the spindle cells were forming fibroblasts and fibrous tissue. The diagnosis seemed to rest between a fibromyxoma of nerve sheaths, and a tumor arising in misplaced cartilage, which is not rare in this muscle.

INTRAMUSCULAR LIPOMA. Of course a lipoma is possible in almost any situation. It is rarely found within the muscles. Herzenberg¹

¹ Centralbl. f. Chir., 1912, p. 110.

reports a case in a woman, aged twenty-three years, in which the lipoma developed in the extensor group of the leg following trauma. It reached the size of one-half kilogram.

BENIGN CONNECTIVE-TISSUE CYSTS. I have no observations to add to my previous discussion of this lesion, *PROGRESSIVE MEDICINE*, 1905, 1908, 1909.

Sarcoma of Skin. Among 40 cases of sarcoma of the skin there was a distinct precancerous lesion in 32. These lesions were as follows: Congenital nevi, 6; scars, 19; fibromas, 7. In 8 cases the history of a precancerous lesion is not very definite.

SARCOMA OF THE SKIN WITH HISTORY OF CONGENITAL NEVUS. In 6 cases the malignant tumor, always a perithelial angiosarcoma, developed in a congenital nevus. As a rule, trauma started the new growth. Very quickly after the enlargement of the nevus the thin epithelium was destroyed, and, in every case, the tumor developed into a fungus. The duration of this malignant growth varied from seven months to ten years, so there was opportunity for much earlier intervention after the beginning of the growth in the nevus. In my discussion on hemangioma I advocated that these epidermal and subcutaneous nevi should be treated at once, even in the youngest infant, when there is any evidence of growth. If the nevus does not grow, treatment by excision with carbon-dioxide snow should be begun at the end of the second or third year of life. Let alone, the nevus either produces a very large mutilating benign tumor, or changes into a sarcoma. Among our 6 cases we have accomplished a cure in 1 only. This case was reported and illustrated in *PROGRESSIVE MEDICINE*, December, 1907, p. 207.

Dr. Heuer, the resident surgeon of the Johns Hopkins Hospital, has collected from the literature 26 cases of the so-called "bathing-trunk" nevus. Malignant tumors developed in 4 of these.

HEMANGIOSARCOMA WITHOUT HISTORY OF CONGENITAL NEVUS. These eight sarcomas resemble, histologically, the sarcoma developing in congenital nevi, but the patients have never observed a congenital tumor. The duration of the tumor varied from six weeks to ten years; 2 appeared as blood cysts, the others as ulcerated fungi. There were no cures in this group. In every one of these cases there had been opportunity for earlier intervention.

SARCOMA OF THE SKIN IN SCARS. Of the 19 cases, 6 have remained well after operation. The cured cases were all fibro-spindle-cell tumors. The cases not cured were round- and spindle-cell sarcoma. I have never observed a tumor in the scar of a wound that had healed *per primam*, but always in open wounds and sinuses which have been a long time healing. The newgrowth in the scar tissue is entirely different from the ordinary keloid; the local growth is larger, and there is early ulceration. Histologically, as I have said, the cured cases were fibro-

spindle-cell tumors—a picture very difficult to interpret as to malignancy. The most interesting case in this group I have previously reported, with illustrations.¹ This patient is well, with no evidence of a recurrence now six years after operation.

Every effort should be made to heal wounds promptly. The first appearance of growth of a character different from that of a keloid in scar tissue is an indication for radical removal of all the scar tissue.

SARCOMA OF THE SKIN IN FIBROMA. In this group there are 7 cases with 4 permanent cures. The tumors in the cured cases are fibro-spindle-cell; the cases not cured, round- and spindle-cell sarcoma. This group has been fully discussed with illustrations in *PROGRESSIVE MEDICINE*, December, 1903, p. 158.

The very rare multiple sarcomata of the skin, of which I have observed 2 cases, and the lesion mycosis fungoides² are apparently hopeless lesions from the onset.

Sarcoma of the Soft Parts. These are subcutaneous tumors, and it is difficult to judge just how to classify them. In this group it is also harder to obtain a history of a precancerous lesion, but in many cases the patients were aware of a subcutaneous nodule which had been present for a number of years, and then, with or without the history of a trauma, had begun to grow. In other cases there is a distinct history of trauma without any evidence of the previous existence of a subcutaneous tumor, suggesting that sarcoma developed in the granulation tissue secondary to the injury.

I have divided these cases according to the histological appearance of the sarcoma, as this illustrates the varying degrees of malignancy and the prognosis.

	Cases.	Cures.
Fibro-spindle-cell sarcoma	6	3
Fibro-myxosarcoma	7	3
Giant-cell sarcoma	2	2
Spindle- and round-cell sarcoma	16	4
Round-cell sarcoma:		
Perithelial	7	0
Endothelial	6	1
Psammoma	1	1
Inoperable	9	0

The prognosis for sarcoma of the soft parts—14 cures in 54 cases—is distinctly worse than in sarcoma of the skin, with 25 cures in 40 cases.

This evidence should emphasize the importance of the immediate exploration of a subcutaneous nodule. Nothing is gained by waiting for developments.

Only in this way can we increase the cures in this group of sarcoma.

¹ *PROGRESSIVE MEDICINE*, December, 1903, p. 157, and 1907, p. 211.

² *Ibid.*, p. 163, and 1904, p. 175.

The next interesting fact is the relation of sarcoma and other subcutaneous lesions of the soft parts to trauma. Given the history of a trauma of any kind, we should expect, after a certain interval in which there is pain and swelling of different degrees, to note the disappearance of the inflammatory tissue produced by the injury. If this does not occur, the lesion should be explored by a surgeon who is able to differentiate the benign from the malignant lesion.

The reappearance of pain and swelling in the injured area should be looked upon as an urgent call for immediate exploration.

LESIONS OF SPECIAL TISSUES

Skin. Most of the surgical lesions of the skin have been discussed under the general subjects—wounds, infections, and tumors—but there are some special diseases and some operative methods that are more satisfactorily discussed here. The first is

SKIN-GRAFTING. In *PROGRESSIVE MEDICINE* for December, 1909, p. 219, I made brief reference to the preliminary communication of John Staige Davis,¹ which has since been published in monograph form. One will find here a review of 550 cases of skin-grafting at the Johns Hopkins Hospital, a very excellent bibliography, and a description of all the types of skin-grafting. The methods employed for taking a thin Thiersch graft from the thigh was illustrated in my short review in *PROGRESSIVE MEDICINE*, December, 1909, p. 220. This method of skin-grafting we began to use when I was resident surgeon of the Johns Hopkins Hospital in 1893. The illustrations will also be found in a short article by Davis in the *Annals of Surgery*, September, 1909, vol. i, p. 542.

Davis has devised a new method of dressing, to be employed both for the thigh from which the grafts have been taken, and for the skin-grafted wound. The material he uses is loosely woven, flat bars of cotton thread of which the coarse-meshed net for curtains is made. This material is soaked in a rubber solution made up of pure gutta-percha, 15 to 30 parts, chloroform, 150 parts. After the chloroform has evaporated, the dry material can be cut in pieces of proper size. These pieces are separated with two thicknesses of gauze, which are placed in a bichloride of mercury solution, 1 to 1000. The solution is changed three times at intervals of twelve hours, and the material can then be kept permanently in this solution for months. On account of the rubber impregnation, it cannot be sterilized by heat or placed in hot solution. Fig. 41 illustrates this dressing material. Fig. 42 shows the mesh applied to a skin-grafted area on a stump. I will discuss the methods of dressing later on.

¹ Johns Hopkins Hospital Reports, vol. xv.

Davis then takes up in detail grafts made of the whole thickness of the skin. The monograph is filled with excellent illustrations and photomicrographs of histological sections of the various types of grafts.

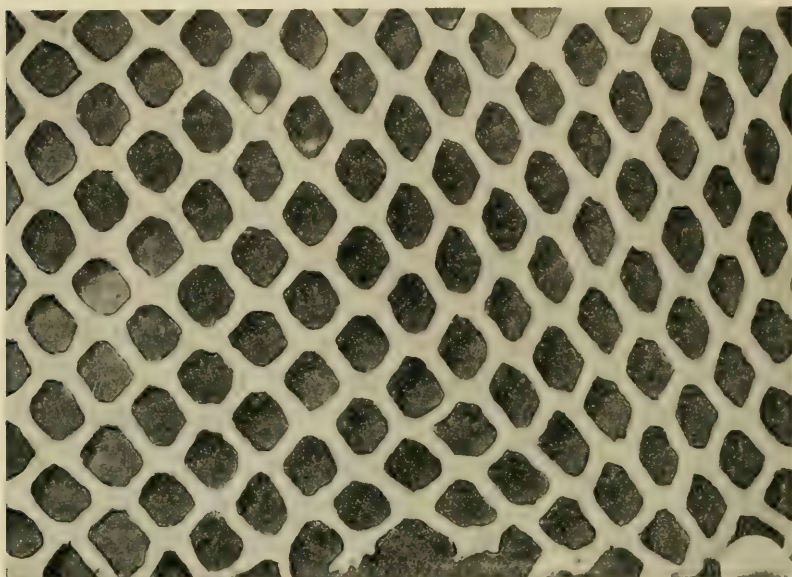


FIG. 41.—Actual size of the openings of the rubber impregnated mesh, used for splinting grafts. (Davis.)



FIG. 42.—Stump covered with whole-thickness grafts, which are held in place by the rubber impregnated meshed material, secured by adhesive straps. (Davis.)

In his conclusions, Davis expresses the opinion that Reverdin grafts are not advisable for large wounds and ulcers. The single large Thiersch graft is the most rapid way when one has a large area to cover. In exposed positions, Davis is of the opinion that whole-thickness grafts give more stable healing than thin grafts, are more durable, and are less disfiguring.

C. E. Tennant comments most favorably upon Davis' method of dressing with the rubberized loose-mesh gauze.

I have had a large experience with skin-grafting, and have obtained the best results from the thin Thiersch graft, the larger the better. With the thick grafts the technique is more difficult, and the probability of their healing less. For defects upon the face, the thick graft should always be tried first, because the cosmetic result is better.

Success with the thin Thiersch graft depends upon attention to the most minute details. In the first place, the graft should be very thin; thicker grafts are more difficult to handle, they have a greater tendency to roll up, are more difficult to spread, and the wound left takes longer to heal. If Thiersch grafts are cut carelessly, one gets with the skin particles of fat—such grafts rarely heal.

The grafts should be most carefully spread, either on the open wound or prepared ulcer. After they are cut, they are first spread, outer surface downward, on rubber tissue; then the rubber tissue is cut slightly larger than the graft; the raw surface is then placed on the wound, and the protective carefully peeled off; the edge of the skin-graft is caught with the dissecting forceps, and the rubber tissue is picked up with a second forceps.

I have tried various methods of dressing and prefer the Halsted silver foil, both for the grafts and the thigh from which the graft has been removed. I am quite convinced that faulty healing, when it takes place, is more often due to the irregular thickness of the graft and the faulty spreading than to the method of dressing.

The thigh from which the grafts have been taken may become a very painful wound, and give rise to much discomfort and long periods of disability. If the silver foil covers the raw surface thoroughly and in sufficient thickness, and if this is covered with the tissue paper that comes between the sheets of foil, and this again is covered with a piece of gauze projecting 1 cm. beyond the silver foil, and this gauze is fixed with imbricated adhesive straps, there is usually primary healing at the first dressing seven to ten days after the application, especially when the grafts have been cut thin. When a second dressing is necessary, I prefer the silver foil again. The only objection to this silver foil dressing is its expense. Next to this dressing, undoubtedly Davis' loose mesh is the best.

One interested in the details of skin-grafting should turn to Davis' monograph and the literature there referred.

Arthur S. Vosburgh¹ recommends that the grafts be covered with a zinc-oxide adhesive plaster which is first sterilized in formalin vapor. Strips of this plaster are placed with small intervals between to allow for the escape of any secretion; they are left in position for from six to eight days. A superficial dressing is applied which can be changed more frequently if necessary. This dressing commends itself for its simplicity, but it has been my experience that many surgeons are content with very indifferent results. In the ideal case the graft covers the entire wound, and there is little or no secretion; the wound heals practically *per primam*. Few surgeons get such results because they do not take the time required.

Evans² is also of the opinion that the Thiersch thin graft is the best for most cases, but when the wound is in an exposed position, when the defect is small and deep, when bone is exposed, the Wolfe full-thickness graft gives a better result. I have been quite successful with the thin graft over bone.

Artificial Epidermization. There has been considerable literature on this subject. The so-called *scarlet red salve* has been used extensively. John Staige Davis,³ who has contributed such excellent work on skin-grafting, contributes now a very good article on scarlet red and its components. The chemistry of the drug is carefully described, and the literature reviewed (89 references). Davis comments that scarlet red and amidoazotoluol will not heal every wound, it will not eliminate skin-grafting, but, when applied with proper technique, it will stimulate the epithelium at the edge of sluggish granulation tissue, and hasten normal epidermization. It does not add to the scar tissue, nor does it increase later contraction. He has observed no harmful effects from its employment.

Gurbski⁴ reports a case of anilin poisoning after the employment of scarlet red ointment. For this reason he prefers azodermin, which is free of the NH_2 -group. Paul Michaelis⁵ recommends amidoazotoluol, which is the active principle of scarlet red. This preparation is the one that Davis now employs. Michaelis uses the drug in powder form in the following mixture:

R—Amidoazotoluol	10 grams
Perhydrol of zinc	20 grams
Subnitrate of bismuth	to 100 grams

This is spread over the wound with a powder spray, and covered with a dry sterile dressing. In three days the granulations are cauterized with nitrate of silver, and dressed with a simple ointment.

¹ Annals of Surgery, 1912, lv, 891.

² Practitioner, December, 1911, lxxxvii, 798; review Centralbl. f. Chir., 1912, p. 398.

³ Annals of Surgery, May, 1911, liii, 702.

⁴ Centralbl. f. Chir., 1912, p. 683.

⁵ Ibid., 1911, p. 575.

I find that scarlet red and the other preparations are being promiscuously used by the general profession and hospital internes. Many seem to think that if the partially healed wound or chronic ulcer is smeared with this ointment, nothing further is necessary for healing. In such cases it stimulates neglect of the usual cleansing methods, the dressings are left on too long, and the surrounding skin becomes irritated.

The result of such treatment is usually distinctly bad as compared with more frequent dressings with proper cleansing. A smaller group of men are really interested in the new method, are painstaking in following the details, and give the wounds and ulcers frequent attention. Perhaps here the better healing is not so much due to the new drugs as to the greater interest which leads to more frequent and careful dressing on account of the stimulus in the investigation of the new therapeutic agent.

I have allowed my hospital internes to use the various types of scarlet red ointment, but have been unable to observe any better healing. In some superficial leg ulcers associated with varicose veins and phlebitis, the scarlet red has been distinctly harmful to healing, as well as painful to the patient. I am confident that more scar tissue is produced and the tendency to keloid formation is greater. From my experience with the healing of open wounds and ulcers, the delayed healing has depended more upon the circulation in the granulation tissue than the sluggishness of epidermization. When we have vascular, healthy granulations, epidermization is usually rapid enough, but the longer the granulation tissue remains uncovered by epithelium, the poorer its circulation, and this is due to the increase of connective tissue at the base and the pressure on the small vessels.

It has been my experience that wounds heal best by constant cleansing with hot salt solution, by stimulation of the granulation tissue with active hyperemia, soaking in hot salt solution when possible, or the application of moist heat with wet dressings, or dry heat in the baking apparatus, or with the electric warming pad. The redundant granulation tissue should be kept down with caustics, knife, or scissors. In certain cases, where there is infection disinfectants like iodine and pure carbolic acid should be employed from time to time. The wound should be dressed with a mild ointment spread on gauze which should not be allowed to stick to the granulation tissue, and there should be frequent dressings.

Frequent dressing for cleansing and active hyperemia by means of dry or moist heat have, in my experience, produced more rapid healing than the application of any drugs. So far in my observation, scarlet red and its elements have, on the whole, had a bad effect on wound healing, because they have led, in the majority of instances, to the employment of this drug alone, with the neglect of the other more important measures.

So much of surgery today is clean, and so many wounds are closed and heal *per primam* that the medical student and young surgical interne gets his experience with open and granulating wounds only at long intervals, and I find the greatest difficulty in stimulating the interest in such wound healing. The best treatment and dressing require more time, and they are more interested in operative procedures. Even in our best surgical clinics today, granulating wounds are neglected, and the healing process is little understood by the junior internes who are charged with the dressing of such wounds.

At St. Agnes' Hospital I am insisting upon more frequent dressings and the application of dry and moist heat. The results have been so gratifying and interesting that neither interne nor nurse objects to the more time-consuming method. The point that I wish to emphasize in this connection is: It is the granulation tissue and not the epidermal edge that needs attention. When there are large defects, skin-grafting is the best method to save time and discomfort.

Muscle. The muscles, on the whole, are tissues usually neglected in the diagnosis and treatment, both of primary lesions of the muscles themselves, and in secondary changes of the muscles associated with other lesions. In the treatment of fractures and arthritis, neglect to include the muscle in the field of treatment leads to longer disability, and often to permanent loss of function. In fracture too tight and too prolonged fixation may start up an interstitial myositis. The worst type of this is Volkmann's contraction. In the more chronic arthritis, with ankylosis and deformity, we are frequently able to get a passively movable joint, but the muscles, due to neglect, have so lost their tone that the patient is unable to reap the full benefit of the new motion in the joint. In the confinement of a single extremity or of the entire body, to forced rest in bed, because of injury or disease, as a rule little attention is given to the maintenance of muscle tone by frequent baths, massage, and a certain amount of voluntary motion on the part of the patient.

MUSCLE TONE. Exner and Tandler¹ have devised an apparatus for the measurement of muscle tone, and they emphasize the importance of this tone. In some cases it is of diagnostic value, as in meningitis, cerebrospinal lesions, and in the early stages of peritonitis. Diminished muscle tone is undoubtedly an important etiological factor in hernia and enteroptosis, and measures should be employed to increase the tone. These authors are of the opinion that the study of the muscle tone of the abdominal muscles after labor will, better than any other investigation, answer the question whether patients should get up sooner or later after the birth of the child. After labor the tone of the abdominal muscles is very much diminished and recovers very slowly.

¹ Mitteilungen a. d. Grenzgeb. d. Med. u. Chir., 1909, xx, 458.

They are rather of the opinion that the early getting up of these patients may retard the restoration of normal tone, and more frequently lead to permanent relaxation of the abdominal muscles.

In all diseases of the extremities the muscles require attention. There should always be frequent bathing, with massage, hyperemia, and the patient should be instructed how to make, at frequent intervals, voluntary contractions of a degree not painful to themselves or harmful to the lesion. Too much emphasis cannot be placed upon this constant supervision of muscle tone in various diseases.

TRAUMA TO MUSCLE. Caminiti¹ reviews the literature on the experimental work on the healing of muscle injuries and the regeneration of muscular tissue. He then gives his own experiments. Pieces of muscle were transplanted and muscles were divided. He gives the results of his histological studies on these wounds from 4 to 105 days after their infliction. In the granulation tissue the connective tissue plays the chief part. There is muscle regeneration, but it is limited and soon fails. We, therefore, cannot expect muscle to regenerate and fill large gaps. He does not enter upon the subject of transplantation of muscle flaps which is of great practical importance in the treatment of herniæ and for certain lesions of the extremities.

The results of a trauma to the muscle may be immediate and remote. The immediate results are hematoma and rupture, with the formation of muscle hernia. The myositis which follows such injuries depends upon the degree of the contusion and the presence or absence of secondary infection. In hemophilia hematomas follow slight injuries. I² have called attention to the hematoma of the psoas muscle which may present itself clinically with symptoms of arthritis of the hip, or psoas abscess. The remote effects of trauma to muscle must also be borne in mind—they are chiefly ossifying myositis and sarcoma. I have discussed this under the heading of the relation of trauma to tumor formation.

MUSCLE HERNIA. The experimental work and the practical results with the transplantation of fascia gives us an opportunity to bridge the defect in muscle hernia, when it is impossible to bring the torn muscles together. Since my discussion in 1908, interesting articles have appeared by Ledderhose,³ Pichon,⁴ Heinemann,⁵ and Lexer and Baus.⁶ The communication of Heinemann in 1911 gives seventy-eight references to the literature, and covers the subject most extensively, but he does not refer to the monograph of Loos.⁷ These two articles

¹ *Centralbl. f. Chir.*, 1909, p. 894.

² *PROGRESSIVE MEDICINE*, December, 1908, p. 168.

³ *Deutsch. Zeitschr. f. Chir.*, 1909, ci, 126.

⁴ *Revue de Chir.*, 1907, xxxvi, 201, anee xxvii.

⁵ *Deutsch. Zeitschr. f. Chir.*, 1911, cxi, 357.

⁶ *Münch. med. Woch.*, 1910, No. 10.

⁷ *Beitr. z. klin. Chir.*, 1900, xxix, 410.

practically cover the subject of muscle herniæ. Ledderhose confines his attention entirely to ruptures of the biceps muscles, Pichon to hernia due to rupture of the aponeurosis.

TRAUMATIC MUSCLE PARALYSIS. Since my review¹ of Samter's paper on traumatic paralysis of the serratus and its treatment, a second communication has appeared by Enderlen,² who reports one of these rare cases, with a reference to a few other observations in the literature.

MUSCLE PARASITES. I find nothing further in the literature since my complete review³ of Danielsen's presentation of this subject, nor have I had any further personal observations of my own.

ACUTE MYOSITIS.⁴ Primary localized inflammation of a single muscle, secondary to trauma, or metastatic from some other focus is much less frequent than similar involvement of bones or joints. Acute myositis leading to abscess is very rare. I find nothing since my review⁵ of Honsell's article. We also observe myositis without abscess formation. This, as a rule, is secondary to a distinct trauma. The athletes call it a "Charley-horse." This type has its chief interest in relation to secondary ossifying myositis. Acute purulent gonorrheal myositis must be very unusual. I find nothing since the communication of Ware,⁶ in 1901.

RHEUMATOID MYOSITIS. A Mueller⁷ gives a very interesting discussion of his clinical examinations of the muscles in acute and chronic rheumatism, but there are no histological examinations. In acute rheumatism the muscles show hypertonus, great sensitiveness, increased heat, and impaired mobility; in chronic cases, less hypertonus, less swelling and heat, and less impaired motion. The hard areas sometimes felt in the muscle, most frequently at their insertions, is not due, according to Mueller, to any fibrous change, but to contractions due to hypertonus.

In all acute and subacute arthritides there is an associated spasm of the muscle. This apparently does not produce any histological changes. The muscle spasm is important in diagnosis, and must be borne in mind in treatment.

TUBERCULAR MYOSITIS. I have little to add to my previous discussion⁸ of this tubercular lesion. N. M. Multanowski⁹ emphasizes the importance of trauma in the localization of tubercular myositis,

¹ PROGRESSIVE MEDICINE, December, 1908, p. 170.

² Deutsch. Zeitschr. f. Chir., 1909, ci, 516.

³ PROGRESSIVE MEDICINE, December, 1908, p. 176.

⁴ Ibid., p. 171; 1903, p. 178; 1905, p. 246.

⁵ PROGRESSIVE MEDICINE, December, 1902, p. 171.

⁶ Ibid., p. 137.

⁷ Centralbl. f. Chir., 1912, p. 443.

⁸ PROGRESSIVE MEDICINE, December, 1903, p. 179; 1908, p. 177.

⁹ Centralbl. f. Chir., 1911, p. 734.

and Bobbio¹ reports a very interesting case: His patient was a male, aged thirty-five years; he began to have pain in the right lower abdominal quadrant followed by the formation of a first-sized tumor; this was apparently situated in the abdominal wall; the skin was not involved; the tumor fluctuated. At operation it was encapsulated, situated between the internal oblique and transversalis. It contained purulent tubercular material, and the granulation tissue of the abscess wall showed tubercles and tubercle bacilli. The patient was a letter carrier. There was no evidence of any other tubercular foci. Multanowski would be interested in this case, and would undoubtedly find some relation between the occupation of the man and the localization of the focus, as the letter carrier's pouch usually rests against the abdomen. The painful scar may have made the patient shift his pouch to the left side, because five years later he was operated on by Bobbio for a similar lesion in the left lower quadrant, and at this time there was no evidence of tuberculosis elsewhere.

LUETIC MYOSITIS. F. Landois,² from Kuettner's clinic in Breslau, gives one of the very best résumés of luetic myositis of striated muscle. The ability to recognize luetic myositis is of great practical importance to the surgeon. The lesion must be differentiated from sarcoma. The luetic lesion, when single, cannot be differentiated clinically from sarcoma. The absence of a Wassermann reaction does not exclude syphilis if the patient has had previous antisyphilitic treatment. A positive Wassermann is very suggestive of lues, but some individuals with sarcoma have had syphilis, and their blood gives this reaction. I agree with Landois that in every case of a circumscribed or diffuse single tumor of muscle there should be an exploratory incision, no matter what the result of the Wassermann test may be, or whether the tuberculin reaction is positive or negative.

No harm can be done by exploring the luetic or tubercular myositis, but when a sarcoma is revealed at this early exploration, one gives the patient the best opportunity for a permanent cure by the radical removal of the sarcoma.

Landois describes only the histological examination of a piece excised for diagnosis, and does not dwell upon the possibility of differentiation from the gross appearance.

In my experience, the three lesions—tubercular and syphilitic myositis and sarcoma—can be differentiated by their gross appearance. Landois, however, brings out a very important histological finding which will be helpful in the rapid frozen-section diagnosis. From an investigation of 8 observations of his own and 19 in the literature, he demonstrates that in luetic myositis giant cells are usually present. These are formed from the nuclei of the striated muscle. In sarcoma these giant cells are practically absent.

¹ *Centralbl. f. Chir.*, 1909, p. 811.

² *Beitr. z. klin. Chir.*, 1909, lxxiii, 315.

The differential diagnosis in the gross and microscopic picture between sarcoma and the various types of granulation tissue presents difficulties even to the experienced eye. Coenen,¹ from the same clinic, discusses this question with illustrations.

In exploring the muscle tumor for diagnosis, if the surgeon cannot make a differential diagnosis from the gross appearance and from the frozen section, he should cauterize the wound with the Paquelin cautery most thoroughly, and then wait for a correct diagnosis by a competent pathologist from the piece excised.

As stated before, in my own experience, I found no difficulties in the differential diagnosis at the exploratory incision. The chief obstacle in the cure of sarcoma has been due to the fact that patients come for treatment after the tumor had been present a relatively long period. This delay makes little difference if the lesion is tuberculosis or syphilis. I find that, on the whole, a single tumor of the muscle is looked upon and treated by the physician as luetic. Only when it continues to grow and the opportune time for excision has passed, does the patient come under the surgeon's care.

This difficulty in differentiating sarcoma from syphilis, and other forms of granulation tissue, may explain some of the remarkable cures of sarcoma from various non-operative forms of treatment, especially Coley's serum.

Luetic myositis may appear within eight months after the initial lesion; the earliest cases reported are eight and thirteen weeks. However, it is usually a later manifestation—from twelve to fifteen years after the primary lesion. In a few cases the interval has apparently been thirty to fifty years. The muscle lesion may be multiple; it is usually single, with no other clinical evidence of syphilis. There are two types: The circumscribed lesion due to a gumma, and the diffuse, infiltrating lesion in which there is a diffuse interstitial inflammatory process in the muscle. Sarcoma also occurs in these ways.

In my experience the gumma can easily be distinguished from sarcoma at the exploratory incision. The central coagulation necrosis of gumma is much greater, relative to the size of the lesion, than the areas of coagulation necrosis seen in sarcoma. About the caseous area and gumma there is a narrow zone of granulation tissue which itself would be hard to differentiate from sarcoma; beyond this zone in gumma there is a narrow hemorrhagic zone which marks the line of demarcation. This, in my experience, is absent in sarcoma.

The diffuse interstitial luetic myositis in its gross appearance also differs from infiltrating sarcoma. There is always more evidence of hemorrhage, edema, and a distinct plastic exudate; in the centre of the lesion one can often recognize remains of muscle.

Landois, therefore, has given us additional help for the frozen-

¹ Beitr. z. klin. Chir., 1909, lxiii, 337.

section diagnosis in that in syphilis we should expect to find the Langhans giant cells.

I reproduce Landois' excellent histological illustrations: Fig. 43 is an example of a Langhans' giant cell. Fig. 44 is a giant cell at the end of muscle fiber up to the middle of which active increase of nuclei has

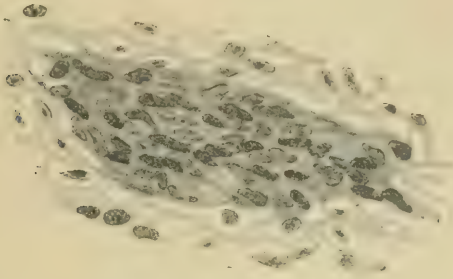


FIG. 43

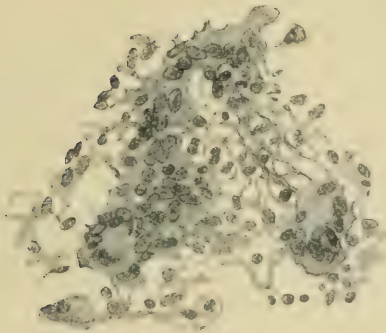


FIG. 44



FIG. 45

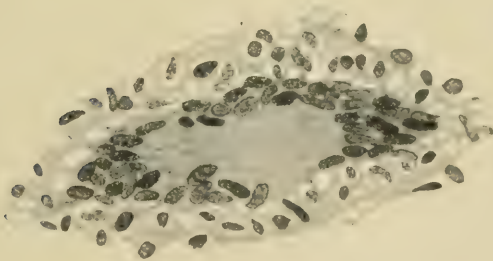


FIG. 46

taken place. Fig. 45 illustrates the central increase of nuclei in a muscle fiber.

As Landois demonstrates, the muscle takes an active part in luetic myositis, and this is seen chiefly in the increase in the number of the nuclei. Fig. 46 illustrates the proliferation of the nuclei at the border

of a muscle fiber leading to the formation of a very large giant cell. Fig. 47 shows a syphilitic tubercle with giant cells.

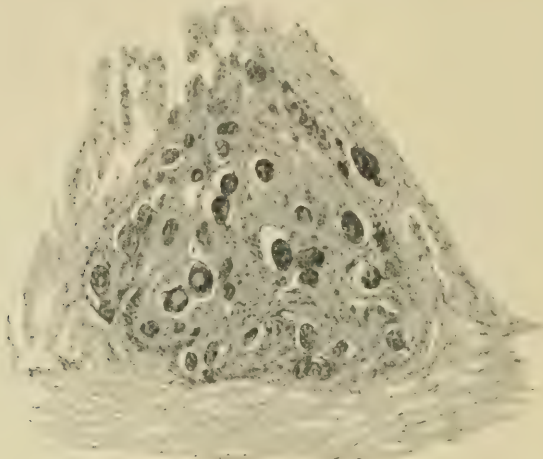


FIG. 47

CHRONIC MYOSITIS. As a single lesion, this is rare, except of the type of the ischemic myositis due to too tight dressing of fracture, which I will discuss next. In 1902 I reviewed¹ the interesting case reported by Biggs, of a lesion in the muscle four months after trauma; there was a distinct ovoid tumor in a muscle of the thigh. I reproduced then the illustrations of the histological pictures,² and reported an observation of my own in which the patient was referred to me with a diagnosis of sarcoma.³ This patient is well today, now twelve years since the exploratory incision.

Felix Pielsticker⁴ has studied histologically the condition of the muscle some time after contusion, and finds evidence of muscle regeneration.

A single or repeated injury to muscle may give rise to a circumscribed or diffuse tumor. If it appears immediately after the injury it is usually a hematoma. The later development of a tumor may be due to chronic myositis, either myositis fibrosa or myositis ossificans. The lesion often localizes tuberculosis and syphilis. Most cases of intermuscular sarcoma give a history of trauma. These facts demonstrate the practical importance of the immediate exploration of the muscle tumor and of the ability of the surgeon to differentiate, from the gross appearance or frozen section, between the inflammatory and malignant muscle lesion.

ISCHEMIC MYOSITIS (VOLKMANN'S CONTRACTION). This is distinctly a preventable lesion. That it occurs frequently and is difficult to cure

¹ *PROGRESSIVE MEDICINE*, December, 1902, p. 167.

² Figs. 51 and 52, *ibid.*

⁴ *Centralbl. f. Chir.*, 1911, p. 284.

³ *Ibid.*, p. 170.

is indicated by the numerous references to the literature.¹ At that time I carefully considered the splendid paper of Jones, of Liverpool. R. H. Sayre² gives his experience with Jones' method of treatment. It will be remembered that Jones is not in favor of operation, but attempts to overcome the contraction by splints producing extension. John H. Jopson³ reports a case and shows the rapidity with which the condition follows the pressure. In his case of a boy, aged eight years, the anteroposterior splints were applied to a fracture of both bones of the forearm. When the splints were removed on the tenth day, the skin showed evidence of pressure necrosis; contractions of the fingers and hand, and ulcers at the points of necrosis followed rapidly. The patient came under Jopson's observation⁴ two months later: the ulcers had healed, the typical contractions of Volkmann were present in the fingers, hand, and wrist. Massage and passive motion failed to help the condition. The method of Jones was not tried. An operation was performed five months after the injury; the muscles were adherent to each other and resembled scar tissue more than muscular tissue, the median and ulnar nerves were surrounded by scar tissue, and the diameter of the nerves was much smaller. The nerves were freed of their scar tissue, the various muscles separated, the flexor sublimis digitorum and palmaris longus were lengthened. The operation was followed by some improvement. In the discussion of this paper operative treatment was advised. Young suggested to employ Jones' method after operation.

Charles A. Powers⁵ reports a case which, in spite of these operative interventions, continued to have so much contraction with loss of function and so much pain from the scar tissue that the patient preferred amputation.

Bardenheuer⁶ presents the most comprehensive review of this subject with references to thirty-four of the best contributions. In addition, he emphasizes a point which to me is most important. In previous literature the writers have been content to investigate the results of the treatment in the later or last stages of Volkmann's contraction. They have not interested themselves in the prevention or in the earlier intervention. Bardenheuer does this. He is of the opinion that the ischemic myositis is but a beginning stage of gangrene, that in all cases the chief etiological factor is some interference with arterial circulation centrally to the lesion; this may be due to blood extravasation with the resulting inflammation in the neighborhood of the

¹ PROGRESSIVE MEDICINE, December, 1908, p. 170.

² American Journal of Orthopedic Surgery, May, 1912, vol. ix.

³ Annals of Surgery, 1911, liii, 578.

⁴ PROGRESSIVE MEDICINE, December, 1908, p. 172, Fig. 6.

⁵ Journal of American Medical Association, 1912, lviii, 1436.

⁶ Deutsch. Zeitschr. f. Chir., 1911, cviii, 44.

fracture, for example, in a supracondyloid fracture of the lower end of the humerus. In such cases even a very light dressing might be sufficient to obstruct the circulation.

In all injuries of the extremities, with or without fracture, one should never apply a tight or fixed dressing in the first few days after the injury. This delay never interferes with the treatment of the fracture. During this time the peripheral pulse should be carefully watched, and the moment this pulse disappears we have evidence of an injury to the main artery. This I have previously discussed.¹ Bardenheuer considers this etiological factor also. But in the lesion we are now discussing there is apparently no injury with rupture to the main artery. The interference with the circulation is due to an inflammatory exudate about the vessels, usually most marked near the seat of fracture. Now, as a matter of fact, when these fractures are not put up in tight dressings and are watched carefully, given gentle massage, hot applications, or dry heat when there is much swelling, the acute ischemic myositis does not develop. If it does, the first symptoms are weakening of the peripheral pulse, cyanosis of the hand or foot, diffuse swelling of the region of the fracture, usually arm or leg.

With these signs, Bardenheuer is of the opinion, operation is indicated at once for the relief of tension. The interference, centrally, with the circulation leads to congestion of the muscles peripherally; the tight fasciæ allow no room for the muscular swelling; acute ischemic myositis is a quick secondary result; contractions and nerve involvement take place later. If incisions are made in this early stage relieving tension the myositis does not take place. In doubtful cases the main artery should also be explored. At the exploration pressure tension from hemorrhage or inflammatory exudate should be relieved and the artery examined for a possible rupture of the intima.

When these symptoms follow a tight dressing the clinical picture of the lesion is distinctly present when the dressings are removed. Yet operative intervention has so far always been delayed, for example, in Jopson's case there were sufficient symptoms on the tenth day when the splints were removed, and more than enough when the patient came under the surgeon's care two months later. It seems to me that Bardenheuer has made a most valuable contribution in recommending immediate operative intervention for the relief of tension. I trust to develop this side of the question more fully next year.

POLYMYOSITIS. Fedeli² reports a case of polymyositis of infectious origin. It resembled the polyarthritis associated with acute infectious diseases. His patient was a male, aged fifty-five years, suffering with

¹ *PROGRESSIVE MEDICINE*, December, 1899, p. 190; 1910, December, p. 217.

² *Gazz. degli Osped. e. delle Clin.*, 1909, No. 103; review in *Centralbl. f. d. Grenz. d. Med. u. Chir.*, 1910, xiii, 71.

a streptococcic otitis media and general infection; there developed multiple areas of pain in the muscles followed by circumscribed tumors; these did not suppurate, but the autopsy showed that these areas were each due to an interstitial myositis with great degeneration. In his discussion he calls attention to three other forms of polymyositis: (1) Dermatomyositis of Unverricht; in this lesion there are multiple skin changes—edema, roseolæ, and purpura. (2) Polymyositis hemorrhagica of Lorenz; here the myositis is characterized by small hemorrhages between the muscle fibers. (3) Neuromyositis of Senator; in this type there is apparently a peripheral neuritis leading to anesthesia and paralysis.



FIG. 48

POLYMYOSITIS OSSIFICANS PROGRESSIVA. This rare and hopeless disease, which I have previously discussed,¹ apparently has no relationship to the types of polymyositis just described. It must not be confused with the myositis ossificans of a single muscle in which the etiological factor is trauma. Elliott,² in reporting a single observation with *x*-rays, gives a short but excellent review of the literature. The

¹ PROGRESSIVE MEDICINE, December, 1902, p. 166.

² Journal of American Medical Association, 1911, lvii, 873.

lesion begins generally in early childhood, even a few days after birth; in a few rare instances later in adult life. Juengling¹ reports the cases from Perthes' clinic in Tübingen with good photographs and x-rays, and a discussion of the literature. Fig. 48 shows the multiple ossified areas in the muscles of a young child.

MYOSITIS OSSIFICANS. This single lesion of muscle secondary to trauma has been most carefully presented in *PROGRESSIVE MEDICINE*.²

It is a lesion of great surgical interest and importance. Considerable literature has accumulated since 1910. Capelle,³ Bernelli,⁴ and Coenen⁵ report on bone formation in laparotomy scars. I have just called attention to this in the discussion of ossification of fasciæ. In the ossification in scars of a laparotomy wound, the bone formation is rarely, if ever, primary in the muscle, but in the scar tissue itself.

Ewald⁶ considers the ossifying myositis which is observed during the healing of fractures and with arthropathies. Klose⁷ reports a case of rare localization in the deep muscles of the neck. Dr. Halsted, in his clinic, operated upon a patient with the ossifying lesion situated in the quadratus lumborum muscle. This, too, is a rare localization. Gottstein⁸ gives a very interesting observation. His patient, eight years after an operation for a circumscribed ossifying myositis, had a recurrence after a second trauma.

Sudeck⁹ again brings up the question in controversy as to the etiology. He is of the opinion that myositis ossificans is not myositis at all, and not a primary muscle lesion. It is of periosteal origin, or parosteal callus. In proof of his view he quotes the common occurrence of ossification into muscle in dislocations at the elbow-joint—80 to 90 per cent. of the cases, and the very rare occurrence of this lesion in the tremendous number of cases of trauma to muscle with or without fracture.

The settling of this question as to etiology will have no practical bearing on diagnosis and treatment. The chief mistakes that have been made in the past, especially in this country, have been along the line of mistaken diagnosis. This lesion has been diagnosticated and treated as sarcoma. I have discussed this and the differential diagnosis in my previous contributions to *PROGRESSIVE MEDICINE*.

Fascia. This tissue is rarely the seat of primary lesions, but the fascia is a very important structure. The knowledge of the different

¹ Beitr. z. klin. Chir., 1912, lxxviii, 306.

² December, 1902, p. 166; 1903, p. 178; 1905, p. 245; 1907, p. 215; 1908, p. 167; 1910, p. 220.

³ Beitr. z. klin. Chir., 1911, lxxiii, 776.

⁴ Ibid., lxxv, 549.

⁵ Centralbl. f. Chir., 1911, p. 1185.

⁶ Deutsch. Zeitschr. f. Chir., 1910, cvii, 310.

⁷ Zeitschr. f. Orthop. Chir., 1911, xxviii, 385.

⁸ Centralbl. f. Chir., 1911, p. 1119.

⁹ Deutsch. Zeitschr. f. Chir., 1911, cviii, 353.

fasciæ in the different regions of the body is very important to determine the gravitation of purulent collections. The fascia often presents a barrier to the local growth of malignant tumors, and in operations we use the fascia as the most important landmark in our dissection. I have described this in the removal of malignant glands in the groin.

TRANSPLANTATION OF FASCIA. John Staige Davis¹ has made a most important experimental study on the transplantation of free flaps of fascia. The experiments were performed in the Hunterian Laboratory of the Johns Hopkins University. There were 62 experiments on 39 dogs. The animal was always fully narcotized in ether. In the first group free fascia was successfully transplanted into subcutaneous tissue, into fat, on muscle, periosteum, bone, cartilage, tendons, and ligaments. Microscopic examination demonstrated that the fascia retained its vitality and showed no change in structure. This was true even when the fascia was kept in cold storage for thirty-five days and transplanted into other animals. In the second group the fascia was transplanted into defects of tendon and muscle, and the results demonstrate that these defects can be successfully bridged by fascia. The union between the fascia and the muscle and tendon is strong. In the third group fascia was transplanted about vessels and nerves without any injury from compression. In the fourth group fascia was transplanted into joints and employed for the suture of bone. In the fifth group the free fascia flaps were employed to fill the defects in the skull, dura, and trachea. In the sixth group it was used to repair defects in the abdominal wall, as would be useful in hernia operations. In the seventh group the free fascial flaps were successfully transplanted under the visceral peritoneum of the stomach, intestine, and bladder, in the eighth group, on the liver, kidney, and spleen. The fascial flap checked oozing from the surface on which it was transplanted. It seemed to have the hemostatic action which Cushing has observed with muscle.

As Davis states, these experiments show that fascia may be successfully employed in practical surgery whenever it is indicated, and the literature on both the experimental and practical side is rapidly increasing. Davis gives the literature up to the date of his article. The most recent contribution comes from the clinic of Enderlen, in Wuerzburg, and is by Valentin,² who, in his bibliography, does not refer to Davis' contribution. Valentin's work was a histological study of the free transplanted fascia in the experiments on 5 rabbits and 5 dogs. He calls attention to the fact that Kirschner,³ before the German Surgical Congress, in 1909, was the first to suggest and perform free

¹ Bulletin of Johns Hopkins Hospital, October, 1911, xxii, 372; Annals of Surgery, 1911, liv, 734.

² Deutsch. Zeitschr. f. Chir., 1912, cxiii, 398.

³ Beitr. z. klin. Chir., 1909, lxxv, 472.

transplantation of fascia and to make histological studies. In the literature which has accumulated since then, Kirschner's conclusions are confirmed, and, in clinical work, the field of usefulness enlarged. But very few histological studies have been made. Davis' work, therefore, ranks next to Kirschner's, and it is even more extensive in the number of experiments and in the histological studies.

In practical surgery we can always get the fascia from the patient. If our technique is good we can be quite certain that it will retain its vitality and strength, and we may employ it whenever tissue of this kind is needed. It can be used instead of Baer's membrane for joints; it is the best tissue to bridge defects between muscle and tendons; it will have a larger application in recurrent and postoperative herniæ; we can employ it to cover exposed vessels and nerves after huge defects from injury, and after operations for aneurysm; it may prove to be the best material for fixation of the kidney.

CALCIFICATION OF THE FASCIA. Wollenberg¹ has collected from the literature 35 cases in which bone formation took place in fascia. In 14 the ossification was in laparotomy scars. The etiological factors are very closely allied with those of myositis ossificans—severe single trauma, repeated light traumas, prolonged suppuration, constant pull on fresh scars, and the obscure factors present in the disease myositis ossificans progressiva. Bone formation in muscle and fascia is always a secondary change in scar tissue. This always forms first. Bone formation outside of periosteum and bone itself is no longer a surgical curiosity, and attempts to explain this ossification on the theory of displaced periosteum are out of date.

CHRONIC SUBCUTANEOUS FIBROSIS. Ralph Stockman² is of the opinion that in the so-called Dercum's disease (*adiposis dolorosa*) the fat has nothing to do with the primary pathological process, but the real lesion is a chronic inflammation of the subcutaneous fascia. When it takes place in a fat individual the rolls of fat are contracted into various shapes, giving an unusually deformed picture to the already not very symmetrical patient. In thin people there are no external evidences of the disease. In both the thin and the fat the symptoms are the same—pain everywhere with secondary nervous symptoms which always develop in individuals who suffer from pain over a long period of time. Stockman is of the opinion that the etiological factor is some toxin. It resembles, therefore, the chronic polyarthritides deformans. In thin people the treatment is massage, hyperemia, exercise, fresh air, and diet. In fat people the huge masses of fat must be excised first.

¹ *Centralbl. f. Chir.*, 1912, p. 223.

² *British Medical Journal*, February 18, 1911; review in *Centralbl. f. Chir.*, 1911, p. 608.

Tendons. The diseases of tendons and their sheaths resemble very closely those of the bursæ and joints.

The function of muscular contraction is dependent upon free tendon motion. Any lesion which destroys the tendon or fixes it to its sheath or surrounding tissue impairs muscle function and leads to various types of disabilities.

Trauma may rupture or dislocate the tendon, or produce a tenosynovitis similar to traumatic arthritis and bursitis. The chief danger of an open wound of the tendon is secondary infection and purulent inflammation.

In local infections about the extremities in the region of tendons, the possibility of extension by continuity to the tendon and its sheath must be borne in mind and guarded against.

After a simple contusion, single or repeated, we may have as the result a ganglion, or a tendon-sheath tumor, both of which have been discussed under tumor.

The tendons may be involved as metastatic lesions in infectious diseases. The gonorrheal tenovaginitis is very frequent. In gout and rheumatism the tendons are less frequently involved than the joints.

In the surgery of tendons the chief interest centres in the protection from and the early treatment of infection, the better methods of tendon suture, tendon transplantation, and tendon plasty.

As we have emphasized preventive and unnecessary surgery in this article, we can use the evidence in the literature on diseases and surgery of the tendons to prove again that many of the lesions of the tendons which lead to deformity and disabilities are preventable, and for this reason most of the complicated surgery resorted to in the later stages is unnecessary.

HEMATOMA OF TENDON SHEATHS. The recognition of this as a clinical entity is so infrequent that Kuettner¹ reports his observation in detail. His patient, a male, aged twenty years, observed a swelling on the extensor surface of the hand immediately after falling on the extended hand. The immediate formation of this tumor and its disappearance after massage with a late manifestation of ecchymosis made the diagnosis of a tendon-sheath hematoma. Fig. 49 illustrates the condition immediately after injury. Kuettner found only 2 references in his search of the literature: Juvara, in two communications, reports 3 cases. The hematomas were situated at the base of the second and third metacarpal bone, between them and the radius, and apparently involved the extensor carporadialis. Walter Heineke, in 1868, mentions the possibility of such hematomas.

As Kuettner says, hemorrhage into the tendon sheaths must be a frequent occurrence after contusions with dislocation and fracture, and with dislocation of the tendon itself. As the sheath is torn, the

¹ Beitr. z. klin. Chir., 1904, xliv, 213.

blood diffuses, and it is difficult to make out the exact situation of the hemorrhage. Then, again, the observer is usually interested in the more evident and more severe lesion, and the hematoma of the tendon sheath is then overlooked.



FIG. 49

JERKING FINGER. This is also sometimes called the snap or trigger finger; the French call it "*doigt à ressort*," the Germans "*schnellender Finger*." As the lesion, in the majority of cases, is in the tendon or its sheath, and rarely in the joint, the discussion of this condition belongs here. The two most recent contributions are by Franz Palla¹ and Kr. Poulsen.² These two contributors report their own observations, and discuss the literature *in extenso*.

In the jerking finger the individual can flex the finger to a certain point, when it meets with an obstruction and various degrees of muscular exertion are required to finish the intended motion; the finger jerks as the obstruction is overcome. In some cases the flexion is only completed by passive aid. In many cases there is pain; in others none. In children, on account of the pain, the finger is usually kept flexed. In some instances the obstruction is noted upon extension; in some upon both extension and flexion. The most common etiological factor is a single trauma or repeated traumas or strain in certain occupations. It may be a congenital defect. In a few instances, solid or cystic tumors of the tendon or sheath have been found, very rarely tuberculosis. Perhaps some cases are associated with gout and rheumatism.

The pathological anatomy consists of a thickening of the tendon, or a narrowing of the sheath, or both. In many cases a nodule can be palpated, usually at the metacarpophalangeal joint of the particular finger.

In children who keep the finger flexed and refuse the motion of

¹ Beitr. z. klin. Chir., 1909, lxxiii, 644.

² Archiv. f. klin. Chir., 1911, xciv, 657.

complete extension, operation is indicated at once, because there is danger of permanent contraction. In adults, if complete flexion and extension of the finger are possible without too much pain, operation may be delayed, because there are spontaneous cures. In cases with a great deal of pain, or where the symptoms persist, operation offers a permanent cure. If there is a palpable nodule one should cut down upon this area under local anesthesia, because then one can observe the mechanism of the jerk, demonstrate whether the palpable nodule is the cause, and whether its partial or complete removal restores motion to normal. The tendon sheath should always be opened. If the lesion is in the sheath itself, such as an inflammatory thickening causing the constriction, a benign solid or cystic tumor, a calcified area, or a focus of tuberculosis, this should be removed. In some cases there is in addition, or alone, a thickening of the tendon itself. When this is slight, longitudinal division of the sheath is sufficient; when it is larger, it may be trimmed. In a few cases it may be necessary to resect and do a tendoplasty. In some cases the lesion of the sheath has so compressed and attenuated the tendon that it is better to reinforce it at this point by a plastic operation or the transplantation of fascia. When there is no palpable tumor, and the *x*-ray excludes a joint lesion, one should explore the tendon of the jerking finger at the most common situation (the metacarpophalangeal joint on the flexor side), and if nothing is found there, continue the search down the finger or up into the palm of the hand. Apparently all the operative cases have been relieved without any complication.

The jerking finger has, therefore, a definite anatomical cause, and, in the majority of instances, this cause is in the tendon or its sheath. The first operation was not performed until 1887 by Schoenborn, and until 1905, 46 cases of operation or autopsy findings were reported. Poulsen, among 19 cases observed by himself, operated 5 times.

TENDINITIS ACHILLEA TRAUMATICA. Palla¹ uses "Traumatic Thickening of the Tendons" as the title for his article in which he describes chiefly the jerking finger. The probabilities are that this title explains why Poulsen, in his later communication on jerking finger, overlooked it and missed some very important literature. In the same article, Palla describes a typical affection of the tendo Achillis first brought to our attention by Schanz.² The latter observed, in patients who came to him complaining of pain in the tendo Achillis above the os calcis, a spindle swelling which was also tender; the swelling was always above the bone, it usually stopped before it reached the muscle, but in some cases extended to the muscle. The pain was never at the insertion of the tendon in the os calcis, as in achillodynia of Albrecht, which is due to a bursitis. In Schanz's cases there was always a history

¹ Loc. cit.

² Centralbl. f. Chir., 1905, p. 1289,

of a single or repeated trauma, excessive mountain-climbing, bicycle-riding, tight shoes, or a single trauma. I have observed it in the early stage after too zealous treading of the bellows of a self-player piano.

Schanz cured all his cases of tendinitis Achillea traumatica by fixation with adhesive straps, so he had no opportunity to study the thickening of the tendon microscopically. In Palla's 5 cases he found at operation in each, a thickening of the tendon, which showed, microscopically, definite degenerated areas and inflammation. In 4 of the cases the tendon lesion was associated with jerking finger; in 1, also of the finger, this symptom was absent. This traumatic thickening has been observed on other tendons, and in the plantar and palmar fascia. For this reason I do not see why Schanz should look upon his cases as typical affections of the tendo Achillis. The lesion is common to all tendons, it can be produced by a single trauma, as illustrated in clinical cases and by Palla in his experiments. We should have some terminology to specialize this group in which there is definite spindle thickening after trauma, and the term *tendinitis traumatica* will answer, as it excludes the involvement of a sheath. I have observed effusion into the tendon sheath of the tendo Achillis, and other tendons in a number of cases after trauma, contusions, or excessive muscular action. This is *tendovaginitis acuta*, and probably in the early stage of traumatic thickening of the tendon there is first this inflammation of the sheath with effusion. This inflammatory process later subsides, but thickening of the tendon remains. Perhaps with proper treatment in the recent state, fixation with adhesive straps, the secondary thickening of the tendon might be prevented. In some cases callus and bone formation have been found in the spindle swelling of the tendo Achillis.

Drehmann¹ has observed many cases as first described by Schanz. In his experience the affection is very frequently bilateral, and the top of a tight shoe has much to do with its localization. Von Baracz² has observed the lesion chiefly in the winter months, in bad weather, in fat people with other symptoms of gout and rheumatism. In his cases the localization of the pain and swelling were identical with the cases described by Schanz and Drehmann.

All these authorities agree that this lesion of the tendo Achillis can easily be separated from achilodynia in which the pain is in the heel and the lesion a bursitis with or without bone formation.

Jacobsthal³ gives a very interesting description of 42 cases, observed by himself, in which the common symptom was pain in the region of the heel. There are 2 cases of tendinitis traumatica following contusion with a pathological anatomy similar to that in Schanz's cases; there are 2 cases of partial rupture, one very interesting case of ossification of the tendo Achillis with excellent x-ray reproductions.

¹ Centralbl. f. Chir., 1906, p. 1.

² Ibid., p. 3.

³ Archiv f. klin. Chir., 1908, lxxxviii, 146.

I have observed a similar case which followed fracture of the os calcis. He has also observed 2 cases of fibroma in the tendon, 1 instance of peritendinitis achillea, 8 examples of bursitis achillea profunda, 3 of exostoses of the posterior upper portion of the os calcis, 6 cases of diseases of the epiphyses, 6 of spur formation of the os calcis, and 4 of contusion of the os calcis. In 7 cases of pain in the heel, the diagnosis could not be made.

In his study he does not include tuberculosis, pyogenic osteomyelitis, or fracture of the os calcis, or the very rare tumors of the bursæ. The article concludes with 52 references to the literature.

In the differential diagnosis, therefore, of pain in the region of the heel, there are many possible etiological factors. The *x*-rays are helpful in demonstrating bony changes, or extra-osseous bone formation; palpation may bring out the presence of a nodule. The treatment varies with the location of the lesion and its pathology.

RUPTURE OF TENDONS. Contributors to this lesion confine their attention to the rupture of special tendons. Selberg,¹ Schlatter,² Foerster,³ and Zur Verth⁴ describe spontaneous rupture, or direct division by injury, of the tendons of the fingers or thumb. Roloff⁵ and Mueller⁶ each report rupture of the biceps tendon; Axhausen⁷ discusses the etiology of rupture of the quadriceps tendon. Whether this rupture is due to an open wound, or a contusion, or a severe muscle contraction—the sign which indicates the rupture of the tendon is loss of function. There is usually pain in the recent state, sometimes swelling of the contracted muscle above; in some cases, the depression due to the retracted tendon can be felt. In the recent state operation should always be done unless the rupture is incomplete, as is often the case in the quadriceps tendon. As a rule, the exposure of the rupture and direct tendon suture are not difficult, but, in some cases, even shortly after the injury, there is considerable retraction, and one has to make a larger wound to get at the tendon ends. In neglected cases seen late, operation presents greater difficulties, and there may be required tendoplasty or transplantation.

DISLOCATION OF TENDONS. Ehrich⁸ reports a very rare example of congenital dislocation of the peroneal tendons on both sides in a boy, aged ten years. From his anatomical studies he is of the opinion that the cause is not so much a defective development of the groove in the malleolus, but rather in the upper fascial attachment. The treatment

¹ Centralbl. f. Chir., 1906, p. 710.

² Deutsch. Zeitschr. f. Chir., 1907, xci, 314.

³ Beitr. z. klin. Chir., 1908, lvii, 719.

⁴ Deutsch. Zeitschr. f. Chir., 1909, cii, 569.

⁵ Ibid., 1911, cix, 614.

⁶ Beitr. z. klin. Chir., 1912, lxxviii, 295.

⁷ Deutsch. Zeitschr. f. Chir., 1906, lxxxii, 599.

⁸ Centralbl. f. Chir., 1910, Supplement No. 31, p. 118.

for this congenital dislocation is the same as for the traumatic. One should make a periosteum bone flap from the malleolus to cover and retain the tendons in proper position.

SNAPPING HIP. It is a question whether this lesion is primary in the muscle or tendon. The lesion is sometimes mistaken for habitual dislocation of the hip. When the limb in adduction and flexion is suddenly extended, a snapping noise is heard, and the individual feels something slip in the region of the hip. When the examiner is present during these motions he hears the sound, observes the rapid bulging over the greater trochanter, and feels some tissue more superficial than bone slip by. When this area is explored a relaxation of the anterior bundle of the gluteus maximus and its aponeurotic tendon which passes to the trochanter and fascia lata is found. Division of this, with slight plastic operation overlapping the divided portion and taking up the relaxation, always effect a cure.

The x-ray always shows the head of the femur in place, and there are no changes in measurements. Ebner¹ gives a complete discussion of the subject and the entire literature. He believes it may be congenital, or acquired, due to single or repeated trauma. In the congenital type there may also be an unusual ability to contract this portion of the muscle singly. The trauma leads to relaxation of this portion of the muscle or tendon, there is an increase of connective tissue of a loose type between it and the trochanter, and the bursa is often obliterated.

L. Heully² does not agree with Ebner and other authorities, but advances the view, from his operative experience and cadaver experiments, that it is really a lesion of a portion of the fascia lata which combines with the aponeurotic tendon of this portion of the gluteus maximus.

It is a very rare but interesting lesion. The diagnosis is not always so simple, especially when one is not familiar with the description of the condition found in the literature, because Carl Bayer³ diagnosticated his first case subgluteal bursitis, and at his exploratory operation found no bursa, but a relaxation of the tendinous portion of the anterior bundle of the gluteus maximus muscle between which and the trochanter there was considerable loose connective tissue.

TENDOVAGINITIS CREPITANUS. After a direct contusion or a single excessive muscular action or strain, but more frequently after repeated muscular exertion of a group of muscles unused to this exertion, as in a new occupation or sport, there appears shortly a swelling, and the motion of the tendons in this area gives rise to pain. If the surgeon carefully examines such a case, and has the patients make the painful

¹ Deutsch. Zeitschr. f. Chir., 1912, cxvii, 63.

² Centralbl. f. Chir., 1912, p. 97.

³ Archiv f. klin. Chir., 1907, lxxxii, 266.

motions while palpating the swollen area, crepitation becomes apparent. In much of the literature and most text-books the lesion has been looked upon as a dry synovitis of the tendon sheath with deposits of fibrin similar to a dry pleurisy, and it has naturally been called *tendovaginitis crepitans*. O. von Frisch,¹ from von Eiselsberg's clinic in Vienna, became convinced, from his clinical examinations, that the inflammation was a *peritendinitis*. He proved this to be true in 2 of his cases out of the 13 which he observed. One was an acute case six days after the injury, and 1 a chronic, neglected case of fourteen years' duration. In both, at the exploratory incision, there was edema and increased vascularity of the peritendinous tissue. In the chronic case there was granulation tissue resembling somewhat that in tuberculosis. Microscopically there was found serous infiltration of the peritendinous tissue, increased vascularity, and round-cell infiltration. In the chronic case there was new formation of vessels in the round-cell granulation tissue and scar tissue. The inner surfaces of the sheath and the tendon were not involved. For this reason von Frisch is of the opinion that the disease should be called *peritendinitis crepitans*. As the previous investigations and conclusions were based upon clinical evidence only, we must accept von Frisch's histological proof.

This lesion affects those tendons which, when in excessive action, are brought forcibly in contact with bone or fascia. The most common tendons involved are those of the *extensor carpi radialis*, the *extensor communis digitorum* in the wrist, the *tibialis anticus*, and the *tendo Achillis* in the foot. If these patients come for treatment in the acute stage, fixation with adhesive straps and rest will generally accomplish a cure in two to three weeks. The crepitation disappears in from six to ten days, the pain on motion in about fourteen days. When the lesion is in the tendons of the ankle there may be cramp-like pain in the calf for some weeks. If the patients do not seek treatment, the pain and the swelling get worse, and after a time they are forced to give the part a rest, and then, in the majority of cases, recovery takes place. The recovery is always more rapid with treatment. Von Frisch thinks that there may be a chronic stage. Perhaps the cases described by de Quervain may, in the beginning, have been this lesion. In a case reported by Hildebrand,² in which dislocation of the peroneal tendons was associated with this type of *peritendinitis*, the microscopic picture agrees pretty closely with von Frisch's. This lesion is, therefore, different in its pathology from that found in jerking finger, because in these cases spindle-shaped swelling of the tendons were demonstrable at operation. In *tendinitis Achillea traumatica*, the cases reported by Schanz and Drehmann were not operated upon, so we have no pathological proof of the exact nature of the swelling. The palpable

¹ *Archiv f. klin. Chir.*, 1909, lxxxix, 823.

² *Deutsch. Zeitschr. f. Chir.*, 1907, lxxxvi, 526.

spindle-swelling was thought to be of the tendon sheath; crepitation was not noted. Von Frisch is of the opinion that the clinical picture described by Schanz and others, and the etiological factors, are identical with his peritendinitis crepitans, and that the crepitation was overlooked by the observer. He has, however, no anatomical proof of the nature of the lesion, because, in von Frisch's cases, as also in Schanz's, no exploratory incision was made. The cases explored by von Frisch were in the tendons of the wrist. This difference of opinion shows that, to get a complete picture of any lesion, there must be a pathological anatomical investigation. Von Frisch discusses the literature up to date, and is of the opinion that when crepitation can be elicited the lesion is a peritendinitis.

In my own observation, and in the reports in the literature, the so-called fibromas of the tendon sheath are always of the peritendinous tissue; they are situated outside the sheath; the inner surface of the sheath and the tendon are rarely, if ever, involved. Trauma is the most common etiological factor. The tumors are always cellular fibromas, usually show the formation of new vessels, and giant cells of the foreign-body type are frequent. The entire histological picture is one of a chronic inflammatory neoplasm. It is quite possible, in these cases, that the first lesion was a peritendinitis crepitans.

POST-TRAUMATIC OSSIFICATION OF TENDONS. These cases are closely allied with ossification of fascia, muscle, and in laparotomy scars, and bring up the question whether the bone really originates in the tendinous tissue or gets there from periosteum displaced by the trauma. Grune¹ describes an ossification in the ligamentum trapezoideum and conoideum. Frangenheim² reports a case of ossification of the triceps tendon, and Pancoast³ records what he calls a sesamoid bone in the tendon of the gastrocnemius. I have observed bone formation in the tendo Achillis after fracture of the os calcis, in which in the *x*-ray and at operation the bone had no connection whatever with the os calcis.

I have described these lesions of the tendons and their sheaths in detail, because very little on this subject appears in the ordinary textbooks and in the accessible literature. The lesions, however, are of considerable interest—they are chiefly seen in general practice and in the out-patient clinic. Unfortunately, they are usually overlooked and not correctly diagnosed. Seen, recognized, and treated in the early stage, the results are uniformly good, the period of disability short. Neglected by patient or physician, these lesions often lead to loss of function and deformity, and require a much more difficult operative procedure to accomplish a cure.

¹ Archiv. f. klin. Chir., 1911, xciv, 476.

² Centralbl. f. Chir., 1909, p. 696.

³ University of Pennsylvania Medical Bulletin, 1909, No. 7.

Bursæ. The synovial lining of a bursa is practically the same as that of a joint. Reactions to infection and trauma and tumor formation are identical in both. In bursitis there may be formation of villi, loose bone, and cartilage bodies.

Zehden¹ describes free bone-cartilage bodies in the bursa. Holzknecht² has shown that these bodies and also calcified concretions are demonstrable in the *x*-ray. The bursitis may be chronic or subacute, of traumatic or other etiological origin. When the bursa is situated near a joint, the bursitis, with its calcareous deposits, may interfere with joint motion and give the same locking symptoms as those produced by a loose body in the joint. When a bursa in the pelvis is the seat of the disease, the symptoms may be those of sciatica. Therefore, in all cases of sciatica an *x*-ray should be taken to demonstrate or exclude this possible etiological factor. In some cases there is spontaneous disappearance of both the bursitis and the calcium deposits. If this does not take place, excision is the method of treatment.

Klesk³ calls attention to the fact that the prepatellar bursa is most frequently affected (housemaid's knee); next, the subdeltoid (Codman's disease); then the bursa near the elbow (miners' disease); then the bursa over the trochanter. Other bursæ are less frequently affected. Klesk forgets the bursa over the great toe which is associated with hallux valgus (bunion) and is probably the most common lesion of all. The location of the more frequently affected bursæ demonstrates that trauma is the most frequent etiological factor. One must bear in mind that there are bursæ over exostoses, and the first symptom of an exostosis may be its bursitis.

Haenisch⁴ reports a case of bursitis calcarea which disappeared after massage, exercise, and hot compresses, but the same treatment failed in his second case. The reviewer (Gaugele) has observed, from this conservative treatment, an increase in the signs of inflammation and a greater area of calcification in the *x*-ray.

In mild cases of bursitis this non-operative treatment may be tried—it is often successful. I see no contraindication to its trial in bursitis calcarea; even if the tumor enlarges a little in the unsuccessful cases, it will not make the operation of excision any more difficult.

SUBACROMIAL BURSITIS (CODMAN'S DISEASE). Since my review⁵ in 1908, considerable literature has accumulated. Codman's⁶ last contribution appeared in 1911. This communication is chiefly an answer and criticism of a publication by T. Turner Thomas,⁷ of Philadelphia. Codman's⁸ monograph on this subject appeared in 1909. He makes

¹ Centralbl. f. Chir., 1907, p. 87.

² Ibid., 1912, p. 264.

³ Ibid., p. 631.

⁴ Ibid., p. 631.

⁵ PROGRESSIVE MEDICINE, December, 1908, p. 193.

⁶ Boston Medical and Surgical Journal, July 27, 1911.

⁷ American Journal of the Medical Sciences, April, 1911, cxli, 515.

⁸ Massachusetts General Hospital Publications, October, 1909, ii, 521.

one new point in these communications since my review, that is, the rather frequent partial rupture of the tendon of the supraspinatus should be sutured when the bursa is excised. Codman found calcification in but 2 cases. Thomas is of the opinion that most stiff and painful shoulders are due to a periostitis from tears of the joint capsule, and that subacromial bursitis does not explain these cases satisfactorily.

Thomas comes to his conclusions from clinical evidence chiefly, Codman from definite demonstration of the lesion at operation. The observations in the literature seem to support Codman's views, which, to my mind, allow of more rational treatment. When non-operative measures fail, the removal of the bursæ and suture of the tendon, when rupture has taken place, yield perfect results. The *x*-rays, as first shown by Painter, demonstrate the calcified bodies in the bursa when they are present. This is additional proof of the bursitis.

Wrede¹ reproduces a very good *x*-ray. Lotsy² and others have also been able to demonstrate the bursitis by the *x*-rays.

EXOSTOSIS BURSATA. I³ described this first, with illustrations, in 1903. The bursa in this case was filled with bone-and-cartilage bodies. More recently I⁴ reported an observation of my own of exostosis bursata in the region of the great trochanter which clinically suggested sarcoma. The correct diagnosis was only revealed at the exploratory incision. Thomas S. Cullen⁵ reports a most interesting observation of a cystic tumor developing from the iliopsoas bursa. It contained cartilage bodies and communicated with the hip-joint.

PYOGENIC BURSTITIS. References to this are very infrequent in the literature. Kaumheimer⁶ reports on periarticular suppurations involving the bursæ and tendon sheaths in children, due to the pneumococcus. I have never observed suppurating bursitis, except secondary to traumatic bursitis, or from an open wound. Not infrequently, after tonsillitis, infected throat, and other infections, there may be effusions into the bursæ and tendon sheaths without involvement of joints. The few cases which I have observed have subsided.

TUBERCULAR BURSTITIS. Since my review,⁷ in 1908, a number of communications have appeared on this subject. Cone,⁸ in reporting his interesting observation, gives the complete bibliography and discussion of the literature. Cone's case was of interest, because it contained rice bodies; the subdeltoid bursa was the one affected.

¹ Archiv f. klin. Chir., 1912, xcix, 259.

² Centralbl. f. Chir., 1911, p. 448.

³ PROGRESSIVE MEDICINE, December, 1903, p. 192, Figs. 41, 42, and Plate IV.

⁴ Ibid., December, 1908, p. 196, Fig. 20.

⁵ Journal of American Medical Association, April 9, 1910, liv, 1181.

⁶ Mitteilungen a. d. Grenzgeb. d. Med. u. Chir., 1910, xxi, 598.

⁷ PROGRESSIVE MEDICINE, December, 1908, p. 198.

⁸ Johns Hopkins Hospital Bulletin, May, 1911, p. 155.

The operation consisted of excision. Johnson¹ reports tubercular bursitis in the groin and thigh. The patient was a woman, aged thirty-five; there had been a tumor in the left groin for two years; it was situated to the inner side of the vessels. At the operation the cyst lay between the fascia and adductor muscle. It was easily excised. The contents of the sac was a watery, straw-colored fluid. A second cyst was found behind and outside the first; this cyst lay behind the adductor longus muscle. There is no pathological report. It is my opinion that these cysts removed by Dr. Johnson were not due to bursitis, but were lymph cysts of the thigh. These rare lesions have been fully discussed in *PROGRESSIVE MEDICINE*.² Hirsch's³ communication appeared after Cone's. He also reports a tubercular subdeltoid bursitis filled with rice bodies; here the diagnosis was confirmed by the microscope. As the reviewer states, Hirsch should not employ the term "hygroma" for tubercular bursitis, as he does in his article.

LUETIC BURSTITIS. The only reference I find to this rare lesion is by Churchman.⁴ In reporting his observation most thoroughly, he gives a review of the entire literature since Keyes' first communication in 1876, and summarizes 26 cases from the literature. In the differential diagnosis he gives all the possible types of bursitis. His classification practically corresponds with that which I have given for joints. Apparently syphilis rarely affects the bursæ.

There have been so few pathological examinations that the classification of luetic bursitis has to be based on the clinical features. First, there is the bursitis associated with arthritis; then the type independent of joint involvement. This latter type occurs in three forms: Congestive bursitis, which explains the vague joint pains in syphilis; the second form is hydrops of the bursa, which bursitis with effusion is the most frequent type (he mentions no cases with rice bodies or calcification). In the third form gumma develops and may ulcerate.

Churchman was unable to find any positive evidence of the luetic bursopathies in congenital syphilis.

This communication of Churchman on luetic bursitis is the very best in the English literature, and should be referred to by all interested in this subject.

TUMORS OF BURSÆ. These must be very rare. Nothing has appeared since my last review,⁵ and I have observed no further cases since the one reported and illustrated at that time.

BUNION. This type of bursitis is always associated with hallux valgus. Most patients with bunions and corns either treat the con-

¹ *Annals of Surgery*, 1911, liii, 566.

² December, 1905, pp. 257 and 249; 1908, p. 219; 1909, p. 201.

³ *Centralbl. f. Chir.*, 1910, p. 98.

⁴ *American Journal of the Medical Sciences*, 1909, cxxxviii, 371

⁵ *PROGRESSIVE MEDICINE*, December, 1908, p. 198.

dition themselves, or seek the help of a chiropodist. Surgeons are called upon only for the aggravated condition. Undoubtedly both lesions are preventable by proper shoes, and the early recognition and

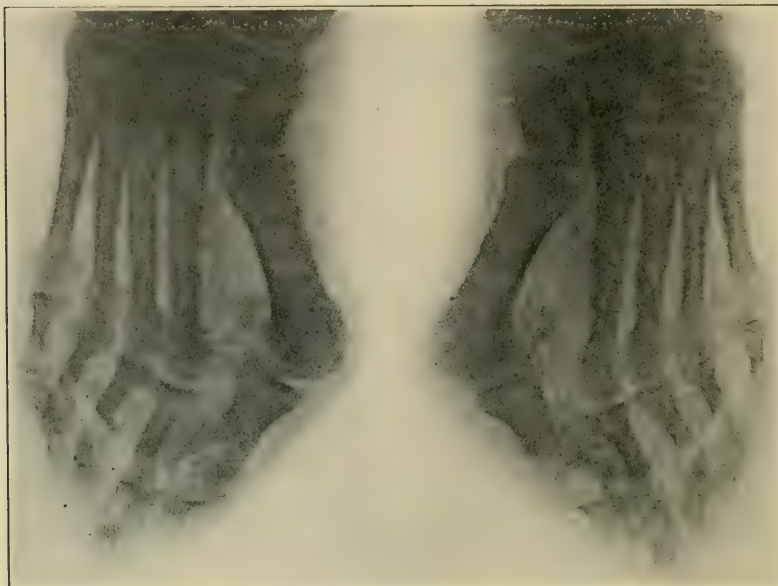


FIG. 50.—Deformity as shown by radiograph.



FIG. 51.—Radiograph of result after nine months.

treatment of flat-foot and other static deformities. In the early stage both conditions should be relieved by simple measures, but the aggravating corn may have to be excised, and the bunion with its marked hallux valgus subjected to operative treatment for relief.

Chas. H. Mayo¹ describes his method of operative treatment. Fig. 50 is an *x*-ray showing the deformity of hallux valgus. One can see that the pressure is due to the dislocated head of the metatarsal bone. Fig. 51 is an *x*-ray after operation showing the correction of the deformity.

The technique of the operation is as follows: A curved incision over the joint making a flap with base down; this skin flap is separated from



FIG. 52.—Showing bony deformity.

the bursa. The bursa is now incised by horse-shoe incision, making a flap with the base toward the first phalanx (Fig. 52). The head of the metacarpal bone is then removed with the forceps, and part of the hypertrophied inner side of the bone is cut away (Fig. 53). The cut bone surface is smoothed with rongeur forceps. The bursal flap is sutured, covering the new joint (Fig. 54). The skin flap is then replaced and sutured. It is better to drain with catgut. The patients are allowed to walk in about two weeks.

¹ *Annals of Surgery*, 1908, xlviii, p. 300.

John L. Porter¹ has employed the following operation for the last five years: The base of his skin flap is turned up instead of down. The

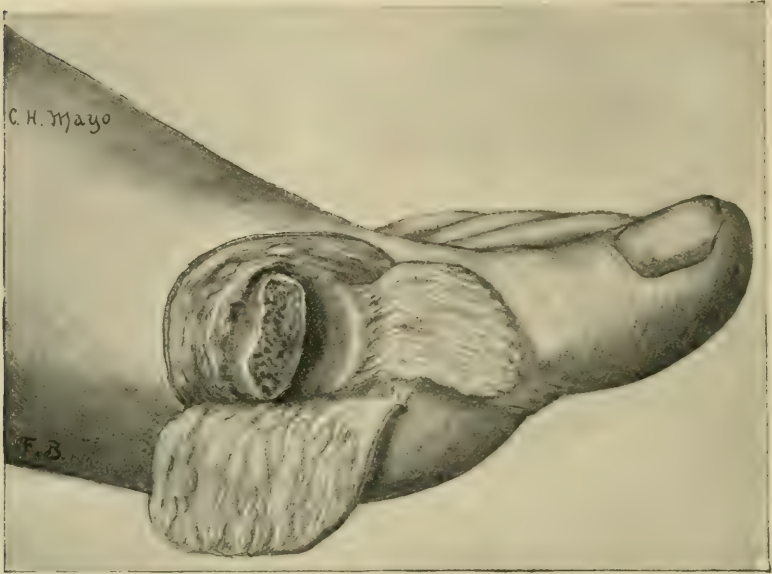


FIG. 53.—Bone section ready for insertion of bursa.

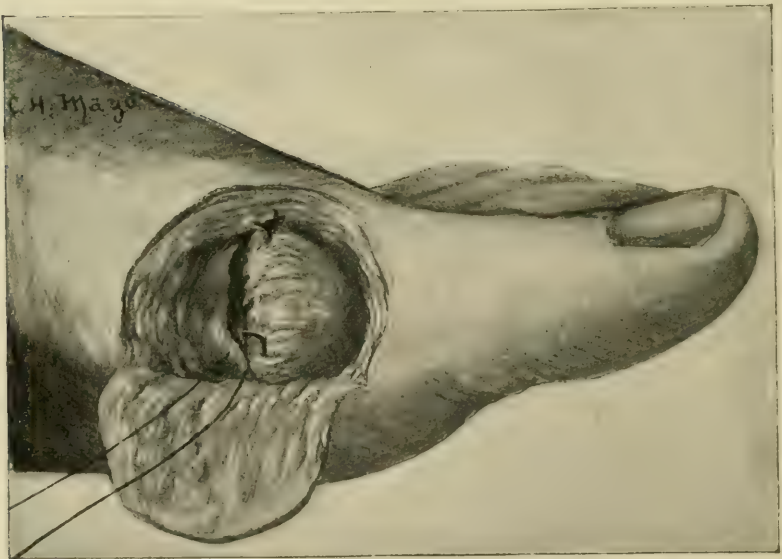


FIG. 54.—Suturing of bursa to develop joint.

capsule of the joint is opened in the same line as the skin incision; the capsule and periosteum are pushed away from the bone, then Porter removes only the medial half of the head of the metacarpal bone—that part which projects beyond the phalangeal bone as shown in the *x*-ray (Fig. 50). The portion which articulates with the phalanx is not removed. Now the toe is pulled medially, correcting the deformity. The tendon of the extensor proprius hallucis is divided subcutaneously at the level of the joint. With the toe held in the corrected position, a mattress suture is passed as shown in Fig. 55. When this is tied, it holds the toe in the corrected position. The wound is then closed. The dressing is often not removed for two or three weeks.

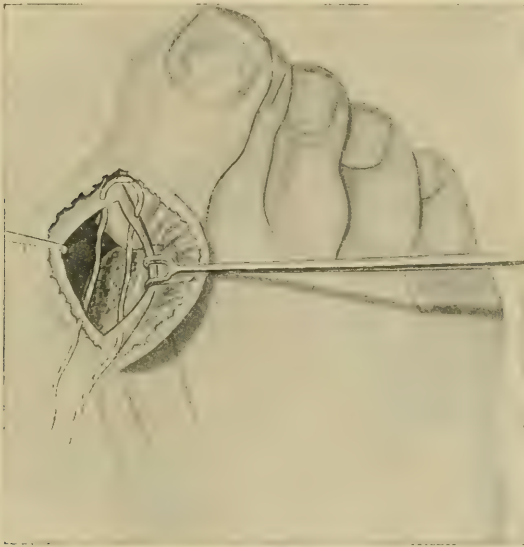


FIG. 55.—Shows bone removed and suture applied.

In about 1908 Harvey Cushing performed an operation somewhat similar to Porter's at the Johns Hopkins Hospital, and I have practised it in about 10 cases with uniformly good results. As I have never performed the operation described by Mayo, I am unable to compare the results, but I am quite certain from my own experience that the method described by Porter gives perfect results. I have observed one case over fourteen years.

PTERNALGIA. The French employ this term for *painful heels*. Franz Koenig¹ reports 8 cases; 12 feet were involved. The inflamed bursæ were either the subcalcaneæ, which the French call Lenoir's, or the bursa achilleocalcaneæ. Quite frequently with this chronic bursitis there is ossifying periostitis, and often inflammation of the surrounding

¹ Deutsch. med. Woch., 1910, No. 13.

fat. In none of Koenig's cases was the so-called spur of the os calcis present. This apparently is a different lesion, and I hope to discuss it under exostoses. In Koenig's cases trauma was the most common etiological factor, gonorrhea often an associated factor. If the local symptoms—pain and tenderness—do not disappear after treatment with tincture of iodine and rest, the bursa and inflamed tissue, with the new periosteal bone, should be excised through an incision on the outer side of the heel.

Zezas¹ calls the condition pteralgia, and agrees practically with Koenig as to the etiology, primary lesion, pathology, and treatment.

A. J. Davidson² calls the condition gonorrheal exostosis of the os calcis. I. D. Steinhardt,³ in reporting 30 cases, is of the opinion that gonorrhea is the most common etiological factor in early adult life; later, gout and rheumatism. In his cases there was always periosteal new-bone formation anterior to or at the tubercle of the os calcis, frequently in the shape of a spicule pointing forward and downward.

It may be doubtful which is the primary lesion—the bursitis or the periostitis. The symptoms and the treatment are identical. Some years ago my colleague, Dr. Baer, demonstrated the gonococcus in a case of this kind. He rather favored a primary periostitis. As the gonococcus is much more apt to attack synovial tissue first and involve the bone secondarily, and as periostitis with bone formation is a common secondary condition in chronic gonorrheal arthritis, the evidence would seem to favor a primary bursitis in the region of the os calcis with a secondary ossifying periostitis.

Morton's painful foot, or metatarsalgia, apparently is not a primary bursitis, but a primary nerve lesion due to the trauma from the heads of the metacarpal bone. It is, therefore, a static condition of the foot.

BONES AND JOINTS

A very comprehensive contribution to this subject, by Murphy,⁴ of Chicago, has recently appeared under the title "Contribution to the Surgery of Bones, Joints, and Tendons." I recommend the careful reading of these papers to the general profession as well as to the general surgeon and the orthopedic surgeon.

Joints. In the literature of some thirty years ago, especially among the German surgeons, I frequently found the comment that they were doing more resection than amputation for the results of joint

¹ *Zeitschr. f. Orth. Chir.*, 1910, xxvi, p. 444.

² *New York Medical Record*, October 3, 1908.

³ *New York Medical Journal*, March 27, 1909.

⁴ *Journal of American Medical Association*, 1912, lviii, pp. 985, 1094, 1178, 1254, 1345, 1426, 1660.

inflammation. They looked upon this as great progress. Today resection is the last resort in the treatment of the very late stage of arthritis. It should be the ambition of physicians and surgeons to recognize the etiological factor of the joint inflammation, and to institute local treatment at such an early period that the joint lesion is cured with restoration of joint motion and muscle function.

Although the etiological factors of all acute and chronic forms of arthritis are as yet by no means established, still we know enough, in the majority of cases, to accomplish such an ideal result if we are given the opportunity to apply our art in the early stage of the disease.

The physician, in his search for the portal of entrance or local focus which is giving rise to the general infection and the arthritis, frequently forgets the treatment of the joint or joints during this investigation, while the surgeon is very apt to concentrate on the non-operative or operative treatment of the secondary or metastatic joint lesion, and not include in his field of vision the more remote and often obscure primary focus.

The only primary lesion of a joint must be secondary to a trauma with or without an open wound, or tumor formation. All other joint diseases are secondary or metastatic.

When we can establish the traumatic origin, or find at exploratory arthrotomy the tumor formation, there is no need for investigation beyond the joint lesion. But in many cases the trauma is but a secondary exciting cause lighting up or localizing a joint inflammation, the etiological factor of which is in some other part of the body. For this reason, even when the joint lesion shows its first symptoms after a trauma, this possibility must be borne in mind.

The secondary or metastatic arthritides may be divided into three groups. In the first group the primary focus has healed. This is true in most cases of pyogenic arthritis, secondary to pneumonia, to infectious diseases, such as typhoid, and the exanthemas of children; and in many cases of gonorrheal arthritis. Here, although we may know the etiological factor, there is no treatment except for the metastatic lesion. In the second group the primary focus is discoverable, and its eradication, especially in the early days of the arthritis, is the most important feature of the treatment. This is especially true in the polyarthritis (usually called acute joint rheumatism) secondary to tonsillitis. Apparently infectious tonsillitis is responsible for many cases of acute and chronic polyarthritis. The first important step is the removal of the tonsils. Adenoids, infections in and about the teeth, inflammations of the nasal cavity, infections of the various sinuses communicating with the nose are responsible for a certain number of cases. The possibility of a latent gonorrheal infection must always be borne in mind and the disease given proper treatment, if present. One should search for an inflammatory focus, and if this can be found it should be

eradicated. One is most fortunate to be able to find such a focus and to remove it in all cases of arthritis.

This has a most beneficial effect on the joint inflammations, and after their recovery usually prevents recurrent attacks.

Cases have been reported in the literature in which recurrent attacks of mono- or polyarthritis have ceased after appendectomy, after drainage of the gall-bladder for cholecystitis, and after the removal of apparently non-infected cysts and hematomas.

In all cases of tuberculosis of the joints, one should look for a focus elsewhere, but, in my experience, especially in children, we seldom find it; in adults tuberculosis of the lungs can more frequently be demonstrated.

The possibility of lues as the etiological factor should never be forgotten. Today this can be settled by the Wassermann reaction. In many cases the neuropathic factor can be demonstrated, especially tabes and syringomyelia. In gout the etiological factor is without much doubt dietetic. Then there are the joint lesions of scurvy, hemophilia, and purpura which disappear if these conditions are curable.

In the third group, up to the present time, we have failed to demonstrate the etiological factor. In children we see acute, and, more especially, chronic, polyarthritis which may go on to ankylosis, and in which it is impossible to demonstrate any focus outside of the joints. The joint inflammation has all the characteristics of an infection, yet bacteriological examinations are negative.

In adults, especially in women at the menopause, and in men with arteriosclerosis, we observe chronic recurrent attacks of polyarthritis which often improve after a time. At present great interest is taken in the possible relation between chronic polyarthritis and gastrointestinal lesions, especially of the colon. There is no doubt that there is a chronic toxemia associated with stasis in the colon, and that this may produce chronic arthritis.

In many cases more than one factor is involved, and, while we are carrying out a treatment which has for its object the cure of the arthritis, we must be constantly searching for all the factors.

The traumatic factor is a very important one. Often we forget that the history of an injury or a sprain by no means covers all the possibilities of trauma. The trauma may be due to some deformity, such as a flat-foot, a knock-knee, a bow-leg, a coxa vara, or a muscle weakened or paralyzed by poliomyelitis, which so influences joint function that motion is accomplished with constant slight trauma. In certain occupations, one or more joints may be subjected to unusual traumatism with a resultant arthritis.

The etiological factor, whatever it may be, may have given rise to certain changes in the joint which produce constant trauma, for example, loose bodies, dislocated or loose semilunar cartilage, synovial fringes

(villous arthritis), intra- and extra-articular lipoma, periosteal bone formations (osteo-arthritis). One, therefore, should investigate the traumatic factor within, as well as without, the joint. After the traumatic factor has been excluded and the tonsils removed, the joint inflammation may be kept up by some gastro-intestinal lesion. Perhaps this lesion of itself was not sufficient in the first instance to give rise to the arthritis, but the joint inflammation, once started by the trauma or the infectious agent, is kept up by a third more obscure factor.

The diagnosis and treatment, therefore, of joint lesions today is by no means simple.

I am confident, however, that if we are given the opportunity to see arthritis in its early stage, the more extensive surgical measures for complete or partial ankylosis will become less frequent every year. It cannot be looked upon as a triumph of medicine or surgery to accomplish a cure with joint ankylosis. The restoration of joint function after ankylosis by the interposition of soft parts of foreign material, or the transplantation of joints, is undoubtedly a brilliant achievement, yet, in the majority of instances, it should be considered unnecessary surgery, in that it is an intervention at a stage of the disease which should never be reached if proper treatment had been instituted early.

Traumatic Arthritis. FREE JOINT BODIES. There is little to add to my previous discussion.¹ The moment a diagnosis of a free joint body can be made, arthrotomy should be performed, with removal of the joint body. In some cases, even when a positive diagnosis cannot be made, the joint should be explored in cases of doubt. Let alone, a free joint body may give rise to a destructive arthritis deformans. I have observed two such cases and the literature contains others. E. G. Brackett and R. B. Osgood² describe an incision through the popliteal space when the joint body is situated near the posterior capsule—a position difficult of access through the usual lateral arthrotomy. The incision is made about 10 cm. long in the popliteal space, slightly within the median line; after the division of the skin and subcutaneous fat there is exposed the diverging head of the gastrocnemius muscle; separating these muscles, the vessels are exposed; with a blunt dissector, pushing the vessels to one side, one can easily reach the posterior ligament and find sufficient space for palpation of the foreign body. In the extended position the capsule is so tense that the movable body remains fixed and one can cut down upon it with almost a certainty of its remaining in this position. Four successful cases are reported.

I have never attempted the removal of a free joint body in the knee through this incision, nor have I seen it discussed in the literature.

¹ PROGRESSIVE MEDICINE, December, 1899, p. 202; 1906, p. 249; 1910, p. 245.

² Boston Medical and Surgical Journal, December 28, 1911.

In all of my cases I have performed a lateral arthrotomy, in 3 out of 10 the joint body was situated in this posterior position, but could be dislodged with the finger. I prefer to try the usual arthrotomy first; the other incision undoubtedly presents some dangers. One should not choose the more difficult operation with the possibility of injury to vessels, without trying the simpler one first. Nevertheless, this contribution is an important one to the surgery of free joint bodies of the knee, because it has demonstrated that in cases in which one cannot get the body through the lateral incision, this one offers success.

Reichmann¹ again brings up the discussion of the etiological factor. He agrees with Barth that the free joint body is of traumatic origin, and disagrees with Koenig's view of a primary osteochondritis dessicans. This, of course, is of theoretical interest only. Reichmann's patient, a student, aged nineteen years, gave a history of pain in the left knee for two years without injury; fatigue in this limb came on more readily, and now and then there was sudden obstruction to motion. The *x*-ray showed the foreign body resting on the crucial ligament. It was easily removed at an arthrotomy. This shows that the loose body may be pictured in the *x*-ray. We know from the studies of Barth and others that the cartilage body usually has a bone centre; this will cast a shadow on the plate.

CHRONIC ARTHRITIS OCHRONOTICA. The publication of Hans Kolaczek² of one most carefully studied case of this type, and the 28 cases in the literature, is of such interest, and the review by Dr. H. Fritz³ is so excellent, that I give the translation:

The following case furnished the occasion for the article: In a female patient, aged forty-four years, subjected, in von Bruns' clinic, to resection of the knee-joint for fistulous fungus, black discoloration of the cartilage and partially also of the ligaments, tendons, and joint-capsule, was found at operation. On more careful examination, bluish discoloration and rigidity of the conchæ of the ears, and gray color of the sclera was noted; in the skin of the face a few brown-black dots were found over the zygomæ. The urine obtained fresh was yellow, but, on standing, showed increased brown stain which in six to eight days intensified into black. The urine gave all reactions characteristic of alcaptonuria, and, in addition, contained homogentisic acid. Following amputation in the further course of the disease, the entire leg and foot were subjected to careful examination, the results of which, together with the histological study, are reported in detail.

A later exhaustive investigation into the antecedents of the patient revealed the fact that the living and healthy parents of the patient were first cousins. Thereupon Kolaczek examined the entire living

¹ Centralbl. f. Chir., 1912, p. 452.

² Beitr. z. klin. Chir., 1911, lxxi, 254.

³ Centralbl. f. Chir., 1911, p. 702.

family of the patient, *i. e.*, three generations with altogether 35 individuals, and found in 2 further persons, both sisters of the patient, alcaptonuria and ochronosis.

With these 3 cases of his own, the author then tabulates the 28 cases published heretofore.

In the discussion of the pathological anatomical features, the points in which the known facts are supplemented and broadened are summarized briefly in the following statements:

"The cartilages of the small joints may also be pigmented, but the gray tone decreases from proximally to distally. In the cartilages of the large joints the areas of most marked pigmentation show great degeneration of the cartilage. This manifests itself in glassy hardness, slight erosion which leads first to roughening of the surface and later to complete obliteration of the joint cartilage, and further, microscopically, in the absence of nuclear stain. In the tendons, in addition to diffuse gray and black discoloration at the place of attachment, peculiar 'ochronotic tendon nodes' occur, that is, thickenings and indurations of the tendon in definite areas, perhaps those exposed to greatest pressure; these areas are beautifully relieved by their black pigmentation from the gray background of the remainder of the tendon. In the pipe bones (femur) pigmentation may progress until the corticalis assumes a sepia-brown tone."

From the clinical discussion the following may be noted: Ochronosis is a disease of middle and advanced age; the youngest patient, a case of the author, is aged thirty years. The sex is immaterial. In the clinical picture a grayish-blue discoloration and rigid consistency of the conchæ predominate; further, pigmentation of the scleræ which consists of either diffuse gray discoloration, or black-brown mottling. Less frequent is pigmentation of the nose, in 11 cases that of the skin of the face was present. Of interest is the repeated observation of greenish-blue discoloration of the axillary sweat and the condition of the urine already referred to—alcaptonuria.

Alcapton, from our present-day knowledge, is identical with homogentisic acid. This is a normal intermediate product in the breaking up of albumin, which, however, in the normal organism, is at once consumed. Alcaptonuria, therefore, consists essentially in the inability of the alcaptonuric individual to split up the homogentisic acid and to consume it in the organism. We are, therefore, dealing with a disturbance in albumin metabolism, and this places alcaptonuria in the group of metabolic diseases.

In other cases of ochronosis without simultaneous alcaptonuria, the urine was either found normal or showed signs of caboluria. This, as well as the almost constant previous history of dressing leg ulcers with dilute carbolic acid extending over many years, leaves no doubt as to chronic poisoning with carbolic acid as a cause of ochronosis.

The interesting chemical relations of alcaptonuria and carboluria are then discussed.

In addition to the externally visible signs of ochronosis other clinical phenomena occur, such as bladder spasm, diseases of the circulation, and of the joints. The latter show a chronic course, sometimes under the picture of joint rheumatisms, or of arthritis deformans, and may finally lead to complete ankylosis. Kolaczek designates the process as "destructive or ankylosing arthritis ochronotica." The diagnosis of ochronosis now no longer presents any difficulties in any reasonably clear case.

Etiologically, the author points out: "We distinguish today two forms of ochronosis: An endogenic, based upon alcaptonuria; and an exogenic, which rests upon chronic carbolic poisoning or phenolism. We must, however, bear in mind the possibility that in very rare cases some other cause may yet be discovered."

The more frequent and important ochronosis alcaptonurica can, according to the author, in the majority of cases be demonstrated to be due to the intermarriage between near blood relatives. It must, therefore, be interpreted as a degenerative disease or anomaly the outcome of incest.

Illustrations, a tabulation, and bibliography supplement the work, which is equally interesting to the surgeon as to the pathologist and internist.

Bones. The subject which apparently is exciting the greatest interest in the literature is the transplantation of bone in the treatment of fractures, inflammations, and tumors. The subject is undoubtedly one of great importance, and it is fortunate that in recent years we have found how easily tissue may be transplanted. I trust, however, that the condition which necessitates transplantation of bone will grow less frequent, because this treatment, except for a few cases of injury, is one demanded in the late stages of disease only.

Space forbids this year a further discussion of the subject which was begun last December in *PROGRESSIVE MEDICINE*.

In my paper¹ before the American Surgical Association, on the conservative treatment of giant-cell sarcoma, with a study of bone transplantation, I reported a few cases with illustrations. Fig. 36 illustrates well how the cavity of a recurrent bone cyst can be filled by transplanting a piece of tibia. Fig. 37 shows the tibia six weeks after the piece had been removed from it.

The subject of benign bone cysts was presented by me² in 1910. At that time I had 22 personally observed cases. Since then the cysts have recurred in 2. The operation shown in Figs. 56 and 57 appar-

¹ *Annals of Surgery*, August, 1912.

² *Annals of Surgery*, August, 1910; *Transactions of American Surgical Association*, 1910.

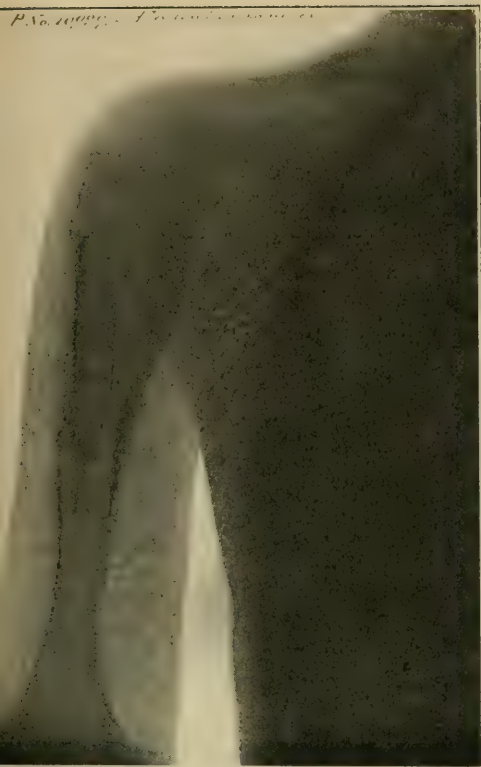


FIG. 56

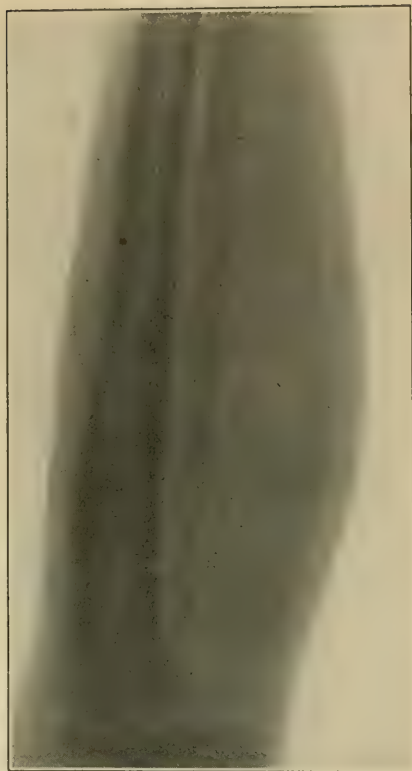


FIG. 57



FIG. 58



FIG. 59



FIG. 60

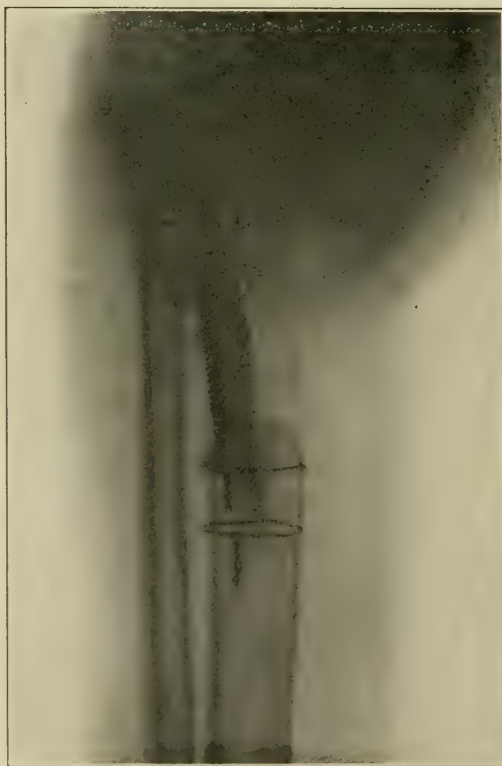


FIG. 61

ently is an ideal one to insure a more rapid and permanent filling of the cavity, especially in recurrent cases. This patient is now well one year since the operation.

Fig. 58 illustrates the giant-cell sarcoma in the lower end of the ulna, and Fig. 59 the result after resection and transplantation of a piece of the fibula obtained by splitting the fibula longitudinally above the point of resection and bringing it down. Figs. 60 and 61 illustrate the *x*-rays eighteen months after operation of the case reported by me

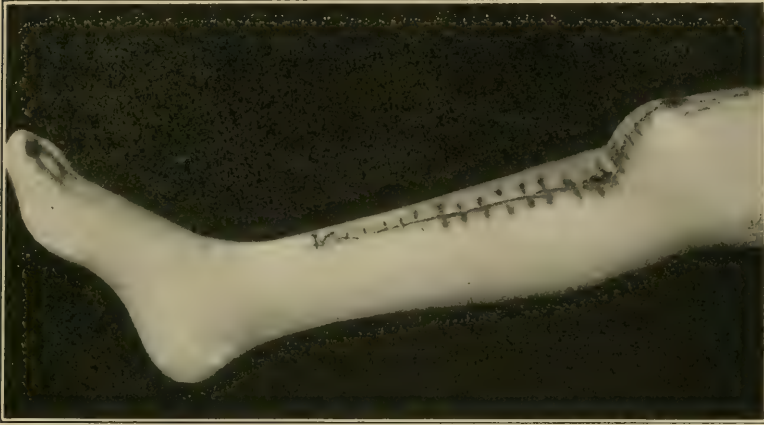


FIG. 62

in *PROGRESSIVE MEDICINE* for December, 1911 (pp. 248, 249, 250, Figs. 32, 33, 34, and 35). In that number I illustrated the patient, the *x*-ray of the giant-cell sarcoma of the upper end of the tibia, and gave a diagram of the method of transplantation. These *x*-rays (Figs. 60 and 61) show that the piece of transplanted tibia is firmly united, and that bone formation has taken place both periosteally and endosteally. The patient has a very fair functional result, and walks without crutches in a light supporting apparatus (Fig. 62).

PRACTICAL THERAPEUTIC REFERENDUM

By H. R. M. LANDIS, M.D.

Aconite. In an editorial article,¹ H. A. Hare recalls some forgotten facts concerning aconite. He points out that when we knew nothing of microorganisms as the cause of disease, it was commonly supposed that hyperemias and congestions were solely dependent upon disorder in those areas through which bloodvessels were freely distributed. Acting under this conception of inflammatory process it was a common practice for physicians to administer cardiovascular sedatives in the early stages of acute hyperemias, with the hope of drawing blood away from the congested area and of diminishing the amount of blood which was sent to it. As is the case with other drugs used empirically, it is almost inconceivable that good results which physicians thought they recognized after this use of aconite could have been entirely imaginary, although it is probable that the manner in which it did good was misinterpreted. It is hardly necessary to point out that no one who clearly understood the principle upon which aconite was used under these circumstances could have thought of employing it after inflammation had existed so long that actual pathological changes in the vessels and adjoining tissues had occurred. There can be no doubt, however, that with much improved conceptions of the cause of the disease the use of cardiovascular sedatives had very materially decreased, and aconite, which at one time was an exceedingly popular remedy, is not employed by many physicians from one year's end to another.

Pharmacologists and practical therapeutists have taught for some years, that the dominant effects of therapeutic doses of this drug are to slow the pulse and directly or indirectly lower blood pressure; a multitude of experiments upon lower animals performed at different times by a large number of observers certainly support this view. In Hare's opinion, the average clinician who has used this drug sufficiently frequently to be a capable judge of its influence, holds the view that its effect on man is similar to its effect upon the lower animals.

It is well to remember that for many years our employment of drugs was purely empirical, and we had little conception of their action. Then followed a period of active investigation in regard to their influence upon animals, which threw much light upon the therapeutic uses of remedies which had been found by practical experience to be of

¹ Therapeutic Gazette, February, 1912.

value. Within a comparatively short time, largely through the introduction of instruments of precision, the effects of remedies when administered to man have been studied and recorded with laboratory accuracy, and with advantageous additions to our knowledge.

Hare directs attention to some observations of Frederick W. Price who has, within the last six months, reported to the Therapeutic and Pharmacological Section of the Royal Society of Medicine of London, the investigations which he has made upon the action of aconite upon the pulse rate, his studies being confined to the observation of its influence in cases of cardiac disease. The results which he has obtained are directly contradictory to those which have been generally accepted as correct, and which we have already stated in this note. As a result of observation upon a large number of patients, using aconite to represent the drug, he concludes that it has no influence whatever in slowing the pulse, and although he does not appear to have made a very large number of investigations upon its other effects, he nevertheless seems to believe that the remedy is one which possesses little value.

While it may be true that aconite in cases of cardiac disease, particularly instances of ruptured compensation, fails to slow the pulse, Hare does not think that this is sufficient justification for the assertion that it never slows the pulse, since the conditions which are present under these circumstances are very different from those which are present when aconite has been employed for other reasons. Thus, it may be pointed out that the administration of digitalis when fever is present nearly always fails to slow the pulse, yet this fact in no way contradicts the even more generally accepted statement that digitalis is the most powerful drug that we possess to diminish pulse rate under ordinary conditions. Aconite may not be able to slow the heart in the presence of dilatation and valvular disease, but may slow the heart in the presence of fever or nervous palpitation.

The editorial concludes that "It is possible that aconite may not act to produce beneficial results in the way which has been generally received, but this does not prove that it does not produce good results when it is properly administered in suitable cases. That it is a valuable remedy in many cases of so-called 'tobacco heart,' in the overacting hearts of athletes, and in certain cases of tachycardia associated with neurotic symptoms, is, we think, undeniable. Dr. Price's research is, however, to be studied with interest not only because of his individual results, but because efforts to determine the influence of drugs by laboratory methods applied to human beings are comparatively few and should be more frequently resorted to."

Antidiphtheritic Serum. The advantages of single over multiple doses of antitoxin, and of intravenous over subcutaneous or intramuscular injections is summed up by Parke¹ as follows:

¹ Journal of Pharmacy and Experimental Therapeutics, March, 1912.

Different investigators have tested the rapidity of absorption of antitoxins from the tissues, and drawn attention to the superiority of intravenous injections. Notwithstanding their reports, subcutaneous injections are still generally employed in the treatment of both diphtheria and tetanus. Park decided to repeat the experiments of others and add new ones.

A series of rabbits and goats were injected with 10,000 units of diphtheria antitoxin, and bled at intervals for ninety-six hours. A number of persons suffering from diphtheria were examined as to the antitoxin content of the blood during the same period of time. The following two tables give one example of each method of injection in goats and one for each in human beings suffering from diphtheria.

The great advantage of the intravenous injections is manifest.

The question of giving the total amount believed to be necessary in a single injection, or dividing it into two or three injections to be given at intervals of six to twelve or more hours, is an important one. The slow absorption of the antitoxin from the tissues would seem to make the single injection by far the better method. The table shows the antitoxic strength of the blood in the methods.

It can be seen that the single dose gives much greater antitoxin content for the first three days.

A large series of cases treated by the different methods has shown that the intravenous injections can be safely given. In all cases of tetanus and in severe cases of diphtheria intravenous injections are indicated.

I. ANTITOXIN CONTENT OF BLOOD IN GOATS INJECTED

(Each received 5000 units)

Method of injection.	Units in 1 c.c. at different intervals of time						
	3d hr.	6th hr.	12th hr.	24th hr.	48th hr.	72d hr.	96th hr.
Intravenous	4.0	3.5	3.0	2.6	2.4	2.0	1.8
Subcutaneous	0.1	0.5	1.0	2.5	2.9	3.0	2.9
Intramuscular	0.3	1.3	2.0	2.8	2.8	2.6	2.4

Weight of goats about 25 pounds each.

II. ANTITOXIN CONTENT OF BLOOD IN THREE ADULT DIPHTHERIA PATIENTS

(Each received 10,000 units)

Method of injection.	Units in 1 c.c. at different intervals of time.						
	3d hr.	6th hr.	12th hr.	24th hr.	48th hr.	72d hr.	96th hr.
Intravenous (1)	3.0	2.7	2.4	2.0	1.5	1.0	0.08
Subcutaneous (2)	0.1	0.2	0.25	0.4	0.55	0.65	0.07
Intramuscular (3)	0.2	0.35	..	0.6	0.6	0.59	0.55

Weight of No. 1 about 100 pounds; of No. 2 about 110 pounds; of No. 3 about about 120 pounds.

	Units in blood at			
	12th hr.	24th hr.	48th hr.	72d hr.
Single dose	0.25	0.4	0.55	0.65
Dose divided into three given at 12-hour intervals	0.08	0.2	0.48	0.62

Anti-influenzal Serum. Serum treatment of influenzal meningitis has been advised by Wallstein.¹ Since more accurate studies on spinal fluid have been made, an increased number of cases of influenzal meningitis have been found, almost all of which have been fatal. Almost all cases are due to an influenzal bacteremia. The organism grows in the subdural space and is swept through the blood. The organism was cultivated on agar slants for twenty-four hours, then washed off with salt solution, and two such cultures, 2 c.c. in all, were injected into the canal of a monkey, giving a disease fatal in thirty-six hours to four days, and comparable to that in man. A goat was then treated with living organisms for eighteen months, when opsonins and agglutinins appeared in his serum, but the serum was not bactericidal *in vitro*. This serum was effectual in securing recovery if injected into the spinal canal twenty-four hours after inoculation. The bacilli are more freely engulfed by the leukocytes, their growth and eruption into the blood hindered. To be successful in the human disease, frequently repeated applications of the serum to the spinal canal will be necessary. The diagnosis can usually be made by immediate microscopic study of the fluid.

Flexner says that influenzal meningitis can no longer be considered a rare disease. All but 6 of the 58 cases thus far reported have terminated fatally. He advises treatment for influenzal meningitis in human beings in the same manner in which the serum for epidemic meningitis is employed.

Antirabic Virus. In a paper entitled "Antirabic Immunization with Desiccated Virus," Harris² gives the details of an elaboration of the Pasteur treatment which bids fair to be of considerable practical value. The point gained may be briefly summarized by the statement that while the serum now available possesses immunizing or therapeutical value lasting but a short time—a couple of weeks—the product described by Harris preserves its efficiency during a minimal period of one hundred and forty-eight days. This is due to a special mode of preparation, the steps of which are: Desiccation of the brain of an inoculated rabbit; reduction to a fine powder and then to a thin paste with water; freezing to solidity. The result is that the paste not only preserves its activity, but it can be sent any distance, its period of efficiency permitting it to be transported over the entire world. On reaching its destination the paste is made ready for immediate use by reduction to powder and solution. The full details are to be published later.

The experimental and therapeutical aspects of the new measure, though still limited to Harris' own labors, are encouraging. He

¹ Journal of Experimental Medicine, 1911, xiv, 73.

² Read before the American Association of Pathology and Bacteriology in Philadelphia, April 6, 1912.

was unfortunate enough in the course of his investigations to inoculate himself, and thus to submit his product to a test in which loss of his own life would have been the penalty had it failed him—a rather unusual experience. Therapeutical tests were likewise made in numerous animals, including dogs, which, while in perfect health, were inoculated by the bites of other animals suffering from hydrophobia in its most virulent form. In all animals thus inoculated under unquestionable conditions and in which the new preparation was employed, rabies failed to develop, while in others, similarly inoculated but not treated, the disease developed. In the human subject the measure has been tried in only 20 cases so far, some after bites from rabid animals, others during various stages of developed hydrophobia. Prompt recovery was obtained in all.

Antiscarlatinal Serum. Reiss and Jungmann¹ report the employment of serotherapy in scarlet fever in 12 cases, and call attention to the remarkable turns for the better in 10 of these patients after an intravenous injection of from 40 to 100 c.c. of serum drawn from several scarlet fever convalescents and mixed.

The disease was unusually severe in each case, and the temperature and pulse dropped by nearly 3° C. in from nine to fourteen hours, the drop beginning after two to four hours. The serotherapy did not seem to have the slightest action on any secondary phenomena, the lesions in the tonsils, lymph nodes, and joints continuing or developing unmodified by the serotherapy. This fact is regarded as proof of the efficiency of the serum, as the fever dropped and the general condition materially improved notwithstanding the presence or progressive course of a destructive angina, for example. They now make it a rule to apply the serotherapy only in those cases in which recent scarlatinal infection is responsible for serious symptoms. The patients all began to convalesce the fourth day or fifth at latest, while in 200 other cases the fever lasted from four to fifteen days, with an average of six days. The fever terminated by crises in only 2 of these 200, while this occurred in all the 10 serum-treated cases. They urge others to try this method of treatment in pure, severe cases, the earlier the better, and never later than the fourth day. The serum must be from patients convalescing from scarlet fever, free from complications and otherwise healthy, at about the eighteenth to the twenty-fourth day of the disease. They prefer to centrifugate the serum from at least three convalescents and distribute it in fused ampullas containing each 50 c.c., to which 5 drops of a 5 per cent. phenol solution has been added. Each separate serum is tested beforehand by inoculation and for the Wassermann reaction.

Antitetanic Serum. Berghausen and Howard² feel, after a careful study of perforating, penetrating, and lacerating wounds contaminated

¹ Deutsch. Arch. f. klin. Med., 1912, cvi, 1548.

² Journal of the American Medical Association, 1912, lviii, 105.

directly by soil or manure, especially those contracted in the streets or about stables and all blank cartridge and giant-cracker perforating and lacerating wounds, that no wound of such a nature should be treated lightly by any physician. By carefully cleansing each wound, using a general anesthetic if necessary to remove all foreign material, and employing a diluted antiseptic to prevent sepsis, and then treating each one as an open wound, the physician has done much to prevent tetanus. By employing one immunizing dose of 1500 units of anti-tetanic serum, to be repeated only when suppuration has not ceased after a week, he can practically assure the patient perfect safety from tetanus.

Aspirin (Acetyl-salicylic Acid). The use of acetyl-salicylic acid in typhoid fever is endorsed by Chambers¹ as an effective means of lowering the temperature when combined with tepid or hot sponging. He gives the drug in doses of from 3 to 5 grains every four hours, and has not noticed any alteration in the blood pressure nor any appreciable ill effects from its use. The skin remains moist, and in some cases there is profuse sweating. The greatest effect on the temperature is obtained by sponging the patient about half an hour after the administration of a dose of the drug, in this way combining the antipyretic actions of the medicinal and hydrotherapeutic agents.

Chambers has been especially impressed with the marked diaphoretic and antipyretic actions of the drug. Three grains every four hours had frequently considerable effect, and in most cases 5 grains at the same periods produced profuse diaphoresis. In only one case was he compelled to increase the dose above 5 grains. In two cases 5 grains every four hours appeared almost too active, as the temperature charts showed a very marked fall in temperature during the exhibition of the drug; there was no untoward effect during the fall of the temperature.

In giving acetyl-salicylic acid to typhoid patients, it is desirable to commence with a dosage of 3 grains every four hours; if this should not be sufficient, the quantity should be gradually increased until the desired effect has been obtained. Chambers suggests as the reason why acetyl-salicylic acid is more effective as an antipyretic in typhoid than in most other fevers, that probably the fever of typhoid is frequently labile in character. This theory also affords an explanation of the undoubted value of hydrotherapy in the treatment of the disease, because it is found that the more readily the temperature can be reduced by a bath or sponge, the better the prognosis.

Ebstein² gives acetyl-salicylic acid to allay distressing cough, and reports several cases in which only good effects were obtained from this medication. One patient failed to get any relief from the use of codein.

¹ British Medical Journal, 1912, i, 113.

² Deutsch. med. Woch., 1911, xxxvii, 1377.

Acetyl-salicylic acid gave immediate relief. Ebstein says that it not only gives relief, but it effects a cure, besides materially shortening the duration of the illness.

Acetone Alcohol. The results of experiments of disinfecting the hands by acetone alcohol is reported by Haberle.¹ These observations were conducted in Hofmeier's clinic at Würzburg. In 25 experiments the hands were rendered practically sterile, and remained so during and after the operations performed. These experiments were made upon persons who were not skilled surgeons, and assistants who were not proficient in minute technique. The hands in many operations became somewhat sodden with moisture, and the virtue of the acetone alcohol method in its efficient action upon the upper layers of the skin. There seemed to be no practical difference in the action of a 20, 30, or 50 per cent. mixture of acetone and alcohol. As acetone is more costly than alcohol this might become for extensive use a matter of importance. It is probable, however, that the higher percentage of acetone increases the action of the alcohol. In experimenting, the hands were artificially infected with staphylococci and allowed to dry completely in atmosphere. The use of 30 per cent. acetone alcohol produces efficient disinfection. As regards the permanency of its action, the hands previously disinfected with acetone alcohol were examined after operations lasting thirty minutes, when perspiration forming in the hands has moistened the skin. It was found that the method was efficient, and that even when the germs were present they were in the vegetating form and not actively virulent. It is believed that if possible the hands should be brushed for three minutes with hot water and soap, followed by the application of acetone alcohol as soon as possible. Where but a short time can be taken in this washing, the acetone alcohol should be used a longer time, if possible. To test the efficiency of the method, the hands were disinfected with acetone alcohol and then inserted into very large sterile rubber gloves, containing warm sterile water, and the hands thoroughly soaked and rubbed in these gloves. The gloves were gauntlets extending to the elbow, and the temperature of the water was kept as high as it could be borne. After thirty minutes the gloves were carefully removed and the water examined for bacteria. A portion of them were found sterile; others had a few bacteria, non-pathogenic, and others had a small number of bacteria. His experience shows that this method efficiently disinfects the superficial layers of the skin of the hand for at least thirty minutes. Operators can readily repeat the disinfection at these intervals during a prolonged operation.

Aluminum Acetate. Stansbury² asserts that a solution of aluminum acetate is more efficacious than the commoner applications, iodine, ichthyol, lead and opium, etc., in the treatment of local congestions

¹ Zeitschr. f. Geburts. u. Gynäk., 1911, Band lxi, 2.

² American Journal of Surgery, February, 1912.

such as boils, carbuncles, and especially in facial erysipelas. He has used it also with marked success in severe cellulitis.

The formula in the *National Standard Dispensatory* for "Liquor Aluminii Acetatis" is:

R—Aluminum sulphate, U. S. P.	300 grams.
Acetic Acid, U. S. P.	300 grams.
Calcium carbonate, C. P.	130 grams.
Water distilled	1000 c.c.

Dissolve the calcium carbonate in the acetic acid, mixed with 200 c.c. of water, and the aluminum sulphate in 800 c.c. Mix the two solutions and allow the mixture to stand for twenty-four hours, agitating occasionally. Then pour off the clear solution and filter. The solution contains 7.5 to 8 per cent. of basic aluminum acetate. It is practically identical with the liquor aluminii acetici of the German Pharmacopœia.

When prepared, the solution should be perfectly clear. It is to be diluted with distilled water, 1 to 7 or 10. Gauze is saturated in several thicknesses, applied directly to the parts, and covered with rubber tissue or oiled silk, and a loose roller bandage is then applied. When employed in this way the dressings remain moist and it is not necessary to change them more than once or twice in twenty-four hours. When the dressings are removed the skin will be found whitish and much wrinkled unless the skin is very much congested, as in erysipelas. Stansbury has kept up the application for days and has never noticed any bad effects whatever.

Boils and carbuncles treated in this way are usually aborted, or if pus has already formed, the area of redness and induration is lessened and pain much reduced.

In facial erysipelas the results are especially good. Stansbury asserts he has never seen it fail to check the spreading of this obstinate infection.

In threatened alveolar abscesses from bad teeth it is, in his opinion, without a rival.

The first case treated by him with this agent was a woman, who said she was going to have another "gathered jaw," as she had four previous times from the same tooth. She already had marked swelling, great pain and sensitiveness, and rise in temperature. A pledget of absorbent cotton the size of a little finger was saturated with a 10 per cent. solution of aluminum acetate and placed within the mouth between the alveolar process immediately over the swelling and the cheek, while another piece of gauze saturated with the same solution was placed on the outside of the jaw, covered with rubber tissue, and bandaged. The inside piece was renewed once in two hours; the outside piece twice a day. There was no further extension of the trouble, and at the end of twenty-four hours the improvement was very marked.

He has treated a few other cases of a similar nature with results equally as good—in fact, has had none to suppurate under this treatment.

A man, aged over seventy years, had his thumb infected by being cut with a piece of broken glass. He was near a hospital, where he had it dressed. From seven to ten days after the accident he had a severe chill, and his physician called Stansbury in consultation. The doctor had opened a small abscess near the first site of injury earlier in the day, but when Stansbury saw the patient his temperature was 104° F., the forearm was swollen, a red streak ran from hand to axilla, and there were enlarged glands above the elbow and in the axilla. The patient was a thoroughly sick man. The entire hand and arm to axilla was enveloped in gauze saturated with aluminum acetate solution, 1 to 8, covered with rubber tissue, and bandaged. Bier's hyperemia was induced by placing a rubber band in the axilla and fastening it over the shoulder. The patient showed marked improvement the first twenty-four hours, and in three days was considered out of danger. He made an uneventful recovery.

In rhus poisoning aluminum acetate is the best instrument at one's command. When the joints in inflammatory rheumatism are acutely swollen and very painful, he has seen it used with much benefit.

In Stansbury's opinion the remedy is seldom used or too little known by the American physicians. It may be because it is not usually kept on hand by our American druggists and it requires twenty-four hours for its preparation. Stansbury states that he has no trouble in keeping it in his office for several months, though there is some precipitation.

Koll¹ claims to have absolutely cured by the local use of liquor aluminum acetate, 42 patients suffering from colon infections of the urinary tract. He emphasizes that the preparation of the liquor is of great importance. The *National Formulary* should be followed very closely. After the full strength solution is prepared he advises diluting each time the liquor is employed, because unless a very carefully distilled water is used the carbonate of the water will throw down a heavy gelatinous precipitate of aluminum hydroxide, which will leave free acetic acid. A second suggestion he makes is to start with 1 per cent. in severely inflamed bladders and in each case control the irritation with opium suppositories.

Anilin. A remarkable production of warts or warty eczema on the hands of four persons working in anilin dyes was noticed by Sachs.² Tests of the various dyes rubbed into the inner surface of a rabbit's ear confirmed the property of these dyes to induce granulation and epithelioma-like excrescences. Control tests with white of lead, cinno-

¹ American Journal of Urology, New York, 1912, viii, 287.

² Wiener klin. Woch., xxiv, No. 45, 1551.

bar, sienna, and other mineral dyes were negative. These experiences thus show that this property of promoting the growth of epithelium is not restricted to scarlet red, but belongs also to a number of other anilin dyes, and they can be utilized for therapeutic purposes.

Anilin is not entirely free from danger, for 2 cases of anilin poisoning are reported by Trespe.¹ The patients were two boys, one of whom had applied commercial anilin copiously to his hands in treatment of ulcerated chilblains; the other boy felt its toxic action only by inhalation, as the two slept together in a defectively ventilated room. The anilin did not seem to have an inflammatory action on the tissues, and the chilblains healed under it, but the general symptoms were severe, and there was a bluish-gray discoloration of the nails, gums, etc. Both boys were found unconscious, but the one who had only inhaled the anilin had recovered the next morning, while the other was still too weak to stand by the ninth day, but then gradually recuperated.

Arsenic. Seiler² relates the results obtained by him in the treatment of 33 patients suffering from chlorosis. Thirteen of these patients were treated with arsenic alone, 12 received iron only, and the remaining 8 were given a combined treatment with both iron and arsenic. Seiler gave the arsenic in the form of arsenous acid, in doses of from 0.005 gram to 0.01 gram a day, either in pill form or by subcutaneous injection. The patients treated with arsenic alone derived little or no benefit. The hemoglobin percentage after two or three weeks of this treatment increased slightly, but there was an actual fall in the number of red blood cells. In addition to this lack of improvement, untoward symptoms frequently occurred from the use of the arsenic. Consequently, Seiler believes that arsenic alone has no therapeutic effect upon chlorosis. Iron alone was given in the form of a modified Bland's pill for four weeks. The hemoglobin percentage increased markedly, and the number of red blood cells rose to nearly normal. The average of 49 per cent. hemoglobin rose to 87 per cent., and the number of red blood cells increased from 4,000,000 to 5,000,000.

The patients treated with iron and arsenic in combination received in addition to Bland's pill an average dose of 0.006 gram of arsenous acid a day. After four weeks of this combined treatment the average hemoglobin percentage rose from 37 to 96 per cent., and the red blood cells increased from 3,000,000 to 5,100,000. Seiler believes that this combination of iron and arsenic has a more rapid and more complete curative action than iron alone.

Spivak³ reports a study of the results in 43 cases from the Genito-urinary Department of the Jefferson Medical College Hospital, in which he used sodium cacodylate. The following conclusions are reached:

¹ Münch. med. Woch., lviii, No. 32, 1705.

² Deutsch. med. Woch., 1911, xxxvii, 1340.

³ New York Medical Journal, March 2, 1912.

1. Arsenic in the form of sodium cacodylate is useful in syphilis. While its action is not as rapid as that of salvarsan, it accomplishes results not unlike those of salvarsan. It is very reasonable that it should, because the arsenic content of "606" is 34 per cent., while the arsenic content of sodium cacodylate is 48 per cent.

2. Being sure that the salt is pure, and making a solution of it fresh every day, it is non-poisonous to the human system, even in doses as high as 5 or 6 grains injected daily for three weeks, or even for a month; in other words, the human system can take in 100 grains of sodium cacodylate in three weeks with no signs of arsenical poisoning. There is no albuminuria, no signs of ocular disturbance; the only untoward effects ever noticed were slight shooting pains in the muscles, particularly those of the shoulder, and sometimes this reached to a muscular spasm. There is no reaction at the site of injection.

3. The drug should be used for effect, beginning with 3 grains daily and increasing as results are noted. The drug is cumulative in action, as improvement continues for a week or so after the injections cease.

4. The best results are seen in early syphilis. It has a marvelous effect on the initial lesion and on the maculoroseolar eruptions. The action on the papular syphiloderm is somewhat slower, but in large doses is effective. The drug has practically no effect on the adenopathies. Enlarged cervical, epitrochlear, and inguineal glands persist in spite of massive doses. Mucous patches and condylomas clear up readily without any other treatment. The drug has a splendid alterative effect, and can be used for that alone in the course of syphilitic treatment. All patients, whether their lesions were benefited or not, speak of a sense of well-being, of added strength, of a better appetite, and even of an increase in weight. On the rupia and tertiary lesions, sodium cacodylate has practically no effect.

5. Immediately after the patient has had his course of injections he should be placed on mercury, otherwise the external manifestations recur. It would even be well to alternate a course of mercurial treatment with a course of cacodylate injections. The two drugs seem to be synergistic; one has a stronger effect in the presence of the other.

6. The effect of the drug on the Wassermann reaction is practically *nil*.

7. The drug should prove to be a useful adjunct in the treatment of syphilis, especially where salvarsan cannot be used, either for financial reasons or through some physical condition of the patient. Sodium cacodylate is cheap, readily prepared, and very easy to administer.

Atophan. "The Action of Atophan in Normal and Gouty Subjects" is discussed by Deutsch,¹ who believes that atophan is by far the best remedy thus far proposed for the treatment of acute gout. It is not surprising that its action is not so marked in chronic gout with marked

¹ Münch. med. Woch., 1911, lviii, 2652.

anatomical changes in the joints. It is also impossible to say as yet whether kidney or heart complications so often associated with gout will be influenced by its use. He summarizes the action of atophan as determined by many different observers, and mentions the different theories advanced for its action. In healthy individuals the administration of small doses of atophan is followed by an increase of the uric acid excretion that is manifest within an hour after the drug has been given. Larger doses of atophan, up to 5 grams, caused an increased uric acid excretion that persists during the following day. The increase in the uric acid ranges from 30 to 300 per cent., and occurs in individuals on a mixed diet and those on a purin-free diet. The purin basis, phosphoric acid, total nitrogen, and total sulphur are not changed, nor is the total amount of the urine increased as a rule. After discontinuing the remedy the uric acid remains at a slightly lower level for one or two days, but soon returns to its former level. With the prolonged administration of atophan the amount of uric acid excreted remains at a higher level when compared to the amount excreted before the drug was given. Similar results are obtained in gouty subjects by the administration of atophan. In addition Frank and Bauch have found that gouty individuals are able to excrete uric acid introduced intravenously, or nucleinic acid given by the mouth, if they receive atophan at the same time. Deutsch gives the details of a number of carefully conducted experiments that in general confirm the above-given facts. He does not draw any definite conclusions from his results. Deutsch used atophan in the treatment of 25 cases of gout with good results. In some of the patients gastro-intestinal symptoms, such as abdominal pain, regurgitation of sour fluid, and diarrhea, occurred as a result of the use of atophan. These did not occur when the remedy was combined with sodium bicarbonate.

Ziegler¹ has observed that the increased elimination of uric acid in gouty subjects after the use of atophan is associated with a marked diminution in the uric acid content of the blood. This increased elimination of uric acid and diminished uric acid content of the blood go hand-in-hand with a marked improvement in the clinical symptoms. Weintraud and others have found that uric acid injected intravenously into gouty patients is rapidly excreted when atophan is given at the same time; while, on the other hand, if atophan is not given, gouty individuals retain the injected uric acid for a long time. They have also found that the same increase of uric acid excretion occurred when the sodium salt of nucleic acid was given with a simultaneous dose of atophan. They believe that the chief etiological factor in gout is an inability of the kidney to excrete uric acid. They explain the action of atophan upon the kidney that increases its ability to excrete the uric acid. Zuelzer does not believe that this explanation is sufficient,

¹ Berlin. klin. Woch., 1911, xlvii, 2101.

although it may be partially true. He believes that the increased elimination of uric acid in gouty subjects following administration of atophan is of diagnostic value in differentiating true gouty affections from non-gouty joint inflammations. He says that the urine of a true case of gout under treatment with atophan will show an abundant urate deposit sufficient to be recognized by the gross appearance of the urine. This deposit of urates will not occur in non-gouty patients. There are, of course, exceptions to this general rule, but Zuelzer believes that this rough test will differentiate the majority of cases of true gout. He adds a note regarding the good results obtained by him in the treatment of recent cases of neuralgia with atophan.

Atropine. The prompt healing of obstinate cases of gastric ulcer under a systematic course of atropine, and the usefulness of this drug in dysmenorrhea have been reviewed in *PROGRESSIVE MEDICINE* by me for 1911. Several interesting papers on this remedy have appeared in the literature for this year.

Selberberg¹ discusses the effect of atropine upon the pulse rate in cases under treatment by digitalis. He states that it is not yet definitely known how digitalis slows the heart, but it acts best on mitral cases of rheumatic origin that have developed auricular fibrillation and arrhythmia, while the senile type of cardiac degeneration, those with a regular rhythm and the tachycardia of fever do not respond so well. Lewis considers it due to a partial block, and that cases with a prolonged A-C interval, that is, with a delay in conductivity, will become slower on digitalis. But clinically, the cases with rapid irregular action, that is, with a short conduction time, become slower. Cushing thinks that digitalis increases inhibitory action of the vagus and prevents many impulses reaching the ventricle. Is the action mainly vagal, or are the conducting fibers of the auriculoventricular bundle themselves, or is the heart muscle lowered in irritability due to improved nutrition? In the senile type there is loss of inhibitory power of the vagus, and as atropine has little effect, also the cardiac musculature is so degenerated that nutrition cannot improve it much. By action of atropine the effects of vagus inhibition could be removed, and so one of the possible factors would be cut out. The patient's pulse was studied at rest, under atropine alone, under digitalis, and under the drugs combined. It was found in the rheumatic cases with rapid heart that the rate was increased; it in no case reached the original rate before drugs; if the effect had been due solely to vagal inhibition, it is fair to suppose that following atropine the old rate would have been reached. There are thus two component actions of digitalis, one vagal and the other on cardiac tissue, and they vary in different conditions. In the case of auricular fibrillation that give high increases of pulse rate on the administration of atropine, digitalis works its best, for following digitalis atropine has

¹ Proceedings of the Royal Society of Medicine, London, 1911, iv, 192.

almost no effect in raising the rate; that is, most of the effects of the digitalis are on the cardiac musculature. These cases, as a rule, do well and may even resume work again. By the study of pulse rates following atropine with and without digitalis, it is possible to find out whether digitalis is acting upon vagus or cardiac tissue.

Gardner¹ gives the following advice as to the technique in atropine and open ether administration:

1. One hour before the administration of ether a hypodermic injection of atropine sulphate, $\frac{1}{150}$ grain, is given with the object of preventing the considerable secretion of mucus in the air-passages which may be otherwise caused by ether. This also prevents sweating during the operation, and thereby retains the body heat. Atropine is also a respiratory stimulant and a vagal obtundent, both valuable qualities unhampered by contraindications. Morphine is not advantageous for routine employment, because it appears to induce oozing of blood from the wound during operation, and certainly retards the reappearance of the laryngeal reflex and the resumption of consciousness during recovery.

2. When the patient is in position for the ether administration a small mouth-prop is inserted between the side teeth and held in position by light pressure upward upon the lower jaw, with the administrator's left hand.

3. A ring pad made of gauze is then rested on the patient's face, encircling the nose and mouth.

4. The wire mask, fitted with a pad made of sixteen layers of gauze, is now laid upon the ring pad, and the patient instructed to breathe in and out slowly through the mouth.

5. The administrator now talks quietly to the patient all the time, while he drops ether continuously upon the mask until unconsciousness supervenes.

6. The mouth is then opened wider with a jaw gag, a tongue clip with finger-loop is inserted, and the tongue drawn slightly forward away from the pharynx.

The mouth-prop is then readjusted, leaving the mouth partly open, as at first. The ring pad and mask are then replaced and the ether drops continued.

By means of this procedure all further anxiety as to the patency of the airways is removed, and labored respiration entirely avoided.

The practical advantages may be shortly summed up under the following headings:

1. A smooth induction period of six to eight minutes.
2. Very early clouding of the mental faculties.
3. Tranquil regular respiration with abdominal relaxation.
4. Absence of mucus in the air-passages.

¹ British Medical Journal, February 24, 1912.

5. No unusual oozing of blood from the wound.
6. Extraordinary safety. Alterations in the patient's position or disturbances of vital structures producing barely any depression.
7. Maintenance of normal blood-pressure and absence of shock owing to the obtundent effects of both atropine and ether.
8. Suitability for goitre operations and adenoids and tonsil extirpation.
9. The patient may be safely propped upright on pillows on return to bed.
10. No after-effects, vomiting being quite rare.
11. Acidosis improbable.
12. Unusual value therefore in septic conditions and those with flagging circulation.

After four years' employment of open ether administration, in contrast with thirteen years' previous use of other methods, Gardner cannot refrain from strongly urging its general acceptance as a substitute for chloroform, and mixtures in all routine surgical work, on account of its extreme simplicity, safety, and convenience for the operator, administrator, and patient.

Atropine in the treatment of phosphaturia has proved of value in the experience of Umber.¹ Obstinate phosphaturia entails constant danger of concrement formation, and it is important to counteract this tendency by rendering the urine acid, which insures the keeping of the phosphates in solution. Phosphaturia, Umber says, has been shown to be the result not of abnormal amounts of phosphoric acid in the urine, but of an excess of the earthy alkalies in proportion to the amount of phosphoric acid. Excessive secretion of hydrochloric acid deprives the urine of its due proportion of acid.

During digestion the acid in the stomach is bound and thus withdrawn from the intermediate metabolism. In the majority of cases of phosphaturia the patients have hyperchlorhydria with general neurasthenia. For these and other reasons cited, atropine has a pronounced action in increasing the acidity of the urine and reducing the elimination of calcium. He supplements the atropine with food as free from lime as possible, restricting the amount of berries, potatoes, and vegetables, and forbidding entirely milk and eggs. He gives the atropine in small doses, not over 0.0005 gram a day at first, increasing in a few days to 0.003 gram a day. The dose is from 10 to 20 drops of a 1 to 1000 aqueous solution of atropine sulphate after meals. He keeps up the maximum dose for two weeks and then gradually reduces it, the entire course requiring three or four weeks.

Blood Serum. Lescohier² reviews at length the serum treatment of hemophilia and other allied diseases, and draws conclusions as follows:

¹ *Therapie der Gegenwart*, Berlin, 1912, liii, 97.

² *New York Medical Journal*, 1912, xcv, 223.

The coagulation time of the blood in hemophilic subjects is greatly shortened by the injection of fresh serum of any species. The sera of the ox and dog should be avoided because they are more apt to produce toxic symptoms. The local application of fresh serum to wounds in patients with delayed coagulation tends to act as a hemostatic. Regular antitoxic sera are less satisfactory than freshly drawn material. The action of serum in accelerating blood coagulation is apparently due to a substitution of active thrombin.

Welch¹ has used normal human blood serum in 32 cases of hemorrhagic conditions in the newborn. His results have led him to the belief that the blood serum is specific in its action in controlling the bleeding.

Nicholson² reports one case in which the employment of human blood serum for melena neonatorum was successful. The subcutaneous or intramuscular injections of blood serum are, in Nicholson's opinion, distinctly preferable to actual transfusion for two reasons: (1) That the latter requires special skill for its performance, it being a delicate operation even in the adult and requiring special appliances; and (2) the difficulty in obtaining suitable donors.

Myers,³ after discussing the use of gelatin solutions used subcutaneously, transfusion in the newborn, human blood serum, and horse serum, speaks of the advantages of the subcutaneous injections of human blood. He reports a case of a child who had on the second day, ten bloody stools and the vomiting of considerable quantities of clotted blood. On the third day there were four bloody stools. When the child was fifty-six hours old, 3 c.c. of blood were drawn from the mother's vein and injected into the subcutaneous tissues of the baby's buttocks. Two and one-half hours later there was another bloody stool. Four and one-half hours after the first injection, a second one of 5 c.c. was given. There were no more hemorrhages, the child making an uneventful recovery. The doses were much smaller than those reported by Schloss-Commiskey, who had recoveries in 6 out of 7 cases treated with 10 to 20 c.c. of blood, a varying number of injections having been used.

Bismuth. An editorial note⁴ points out that in the administration of bismuth it is well to keep in mind the effect desired. If given as a sedative for an irritable or catarrhal gastric mucous membrane, the dose should be given when the stomach is empty and not after a full meal. If the intestinal mucous membrane is in need of a sedative the bismuth should be given in capsules or cachets two hours after meals, as it will then rapidly escape through the pylorus and exert its local action on the intestinal mucous membrane.

¹ Therapeutic Gazette, 1912, vol. xxxvi.

³ Archives of Pediatrics, March, 1912.

⁴ Folio Therapeutica, 1911, Nos. 2 and 3.

² Ibid.

Boracic Acid. Harley¹ formerly used boracic acid solutions for lavage of the bowel in cases of colitis, but after having seen symptoms arise in at least three patients, decided it might not be such a harmless method as one would be inclined to believe. Although when used as an intestinal douche he has not found it to cause any serious symptoms, it has apparently frequently caused marked symptoms of toxemia. He believes it is probable that this poisoning, if in reality caused by boracic acid, is due to some idiosyncrasy, as one frequently has been carried out over a considerable period without any toxemia.

Saunders² reports a case of boracic acid poisoning which resulted from absorption of the drug from colonic irrigations given to relieve dysentery. The symptoms were first a rash resembling that caused by bromides, and then restlessness and delirium, followed by weakness. The symptoms developed suddenly and the rash lasted over ten days. The danger to life was considerable, but the patient recovered under careful watching after immediate withdrawal of the offending drug.

Caffeine. The influence of caffeine on mental and motor efficiency and on the circulation was carefully studied by Hollingsworth.³ He gives a summary of an extended investigation based on experiments carried on in a specially equipped laboratory with the aid of six assistants and sixteen subjects, of both sexes, engaged for full-time service extending over a period of forty days.

In the test for steadiness in which the arm is held extended and any unsteadiness recorded by appropriate apparatus, doses of from 1 to 4 grains of caffeine citrate produced a slight nervousness not apparent until several hours after the dose. A dose of 6 grains produced a marked unsteadiness which was greatest after three or four hours. The effect of caffeine on motor processes was that of a typical motor stimulant manifested by a decided increase in the speed and accuracy of the movements. This effect began in from forty-five to ninety minutes, and lasted from three to four and one-half hours. No secondary or after-effect was produced in the seventy-two hours during which the effects of single doses were traced. In coördination tests, of which typewriting is one, caffeine citrate in doses of from 1 grain to 3 grains produced stimulation and increase of speed, while larger doses produced retardation. In typewriting, however, the quality of the performance measured by the number of errors both corrected and uncorrected, for the whole range of caffeine doses, was superior to the quality yielded by the same subjects on control days, and the increase in speed produced by small doses was not gained at the expense of additional errors.

In the calculation tests, as well as in other tests of mental processes,

¹ British Medical Journal, April 13, 1912.

² Ibid., March 16, 1912.

³ Therapeutic Gazette, January 15, 1912.

all squads showed a pronounced stimulation following caffeine. The stimulation amounted to from 10 to 20 per cent. of the initial performance, whereas the control days showed a corresponding decrease of the initial performance due to fatigue. The total effect of caffeine was greater for these than for any of the other tests. The stimulation began about one hour after the dose and was still present at the close of the day's work, six or seven hours later. No evidence of any secondary depression was found. Instead, the morning following the experiments showed without exception a clear improvement over the work of the morning preceding the experiment. This improvement was not due to practice, as it was never found in the case of the control days.

Wood¹ has studied the effects of caffeine on the circulatory and muscular systems, and sums up his observations in the following manner: In therapeutic doses caffeine has comparatively little influence on the circulation, but it slightly increases the force of the cardiac contraction, thereby causing some elevation in the general pressure. The pulse-rate is usually not markedly affected, but such change as is produced is rather a retardation than an acceleration.

His conclusions concerning the action of caffeine on the motor system are: It acts as a stimulant to the reflex centres in the spinal cord; it enables muscle to contract more vigorously without producing a secondary depression, so that the sum total of muscular work which can be done by a man under caffeine is greater than that done without it. In other words, its use does not cause exhaustion of the nervous and muscular systems, but enables them to act with greater ease.

Calcium Chloride. Kayser² has had considerable success in the treatment of asthma from the use of calcium chloride. The drug is administered in the form of a solution which contains 20 grams of calcium chloride, 40 c.c. of simple syrup, and distilled water up to 400 c.c. The dose is a tablespoonful of the solution in milk every ten hours for a week. In all but 2 of 13 cases, there were no attacks of dyspnea and cough after three days of treatment.

Camphor. The use of camphor has been highly spoken of by several observers in the treatment of pneumonia. Lowenstein³ reports 184 cases treated with camphor and caffeine stimulation with a mortality of 10.4 per cent. Wachter⁴ has had equally good results from the use of camphorated oil, of which from 3 to 5 c.c. are injected once or twice daily as a routine measure.

In the cases of pneumococcic pneumonia cited by Seibert,⁵ camphor injections invariably reduced the toxemia gradually until practically

¹ Therapeutic Gazette, January 15, 1912, p. 6.

² Therap. Monatsheft, 1912, vol. xxvi.

³ Med. Klinik, 1912, vol. viii.

⁴ Ibid.

⁵ Medical Record, 1912, lxxxi, 743.

normal conditions were reached three or four days after the first injection, while the alveolar exudate remained, to be absorbed later on. This phenomenon and the absence of a crisis were noticed in every case.

In 21 cases 12 c.c. of a 20 per cent. camphorated oil were injected every twelve hours in adults, and 6 c.c. in children (the youngest being aged four years), irrespective of the size and weight of the patient, the intensity of the toxemia, and the extent of the local process. In 4 of the next 16 cases the limitations of this treatment were observed. A sudden rise of temperature in two patients on the second and third days of treatment respectively, proved to be due to pneumococcic nephritis, promptly subdued by appropriate doses of hexamethylenamin, while the camphor injections were continued and resulted in speedy recovery. In 2 cases of severe pleuropneumonia from the onset (aged thirteen and twenty-eight years respectively) the camphor reduced the general toxemia markedly, but did not prevent the accumulation of pus in the pleura, necessitating rib resection in the one on the fourth, and in the other on the eighth day after the initial chill, pneumococci in pure culture being found in the exudate, and both patients recovering. The one death among the 37 cases of pneumonia so treated occurred in a man, aged sixty-eight years, weighing 200 pounds, with fatty heart, attacked by pneumococcic invasion of both lower lobes, marked toxemia, and copious bloody sputum. Although early camphor injections had the usual good effect on the sensorium, the temperature and the respiration, his flabby heart began to give out on the fifth day, resulting in a fatal pulmonary edema on the sixth. During the last four years Seibert has made many hypodermic injections of 10 per cent. salicylic acid solutions in 20 per cent. camphor oil in rheumatics, and has observed the prompt destruction of meningococci in the blood of a two-year-old patient by a 3 per cent. salicylic acid solution in a 30 per cent. camphor oil, 5 c.c. being injected every forty-eight hours.

Seibert's attempts to interfere with human and animal pneumococcic infections with camphor have established the following facts: (1) That 10 c.c. of a 30 per cent. camphorated oil (equal to 36 grains of pure camphor) injected hypodermically to 100 pounds of human body weight every eight to twelve hours, do not produce symptoms of poisoning, in fact are harmless; (2) that much larger doses (to the body weight) in rabbits are equally well borne, and (3) that "these quantities of camphor materially assist in overcoming pneumococcic toxemia;" and (4) that the earlier this treatment is resorted to the better the results.

Vignard and Arnaud¹ report considerable experiences with intraperitoneal injection of camphorated oil, injecting 200 to 300 c.c. in adults. The use of 1 per cent. camphorated oil in acute peritoneal

¹ *Revue de Chirurgie*, 1912, xxxii, 685.

infections is increasing, and shows marked results. Its favorable action is due to the fact that it seems to prevent lymphatic absorption of bacteria and toxins, and prevents the formation of adhesions lubricating the loops of intestine so they do not stick together. Minor benefits are its tonic heart action and its antiseptic properties. The authors claim that the method is absolutely harmless.

Climate. "Recent Advances in the Treatment of Pulmonary Tuberculosis by Air, Food, and Rest," formed the subject of an interesting paper by Lawrason Brown.¹ The last half of the nineteenth century, says Brown, saw the institution of the fresh-air treatment of pulmonary tuberculosis, which in the first decade of this century has been extended to the treatment of many other diseases, including nervous and mental disorders, pneumonia, and certain digestive disturbances. While it is known that fresh air is of great benefit in pulmonary tuberculosis, it is not yet fully realized that fresh air benefits patients with other forms of tuberculosis as much as it does those with the respiratory type. It is then safe to say that fresh air exerts no more influence on the lungs than on the rest of the body. Brown mentions several experiments to bear out this contention.

The temperature of the air plays an important role in health and disease. Recent inquiries concerning certain mill operatives in Connecticut have shown that men working on piece-work accomplished more when there was a marked change in the atmospheric temperature, even from cooler to warmer conditions. As a rule, the more vigorous races live in climates where the cold, though pronounced, is not severe enough to limit the production of good crops. The custom of sending young and vigorous patients to climates with equable temperature has long since been abandoned. An average diurnal variation of at least 20° F. is one requisite of a good health resort for tuberculous patients. Sudden changes for vigorous patients act like a tonic, and are to be desired when intelligently met. This is a feature of the winter climate in Arizona, where a marked change occurs each night at sunset. The weight curve of healthy and tuberculous individuals bears this out. In 1200 patients at the Adirondack Cottage Sanitarium, Brown found that the weight began to increase in August and continued to do so until Christmas. It then remained stationary or decreased slightly to Easter, after which it fell steadily to August. A marked change of temperature is usually noticed in the Adirondacks in August, and early September, and the diurnal variations are great.

The dryness of the atmosphere—that is, the degree of humidity, relative and absolute—plays an important part, but can be largely offset by motion of the atmosphere. Mere dryness is of little avail, for nearly every home in America, especially in winter, has an atmosphere containing far too little moisture—in fact, far less than is to be

¹ Journal of the American Medical Association, 1912, lvi, 1678.

found in the deserts of Egypt or Arizona. The really important point is the amount of moisture that can be absorbed by the atmosphere from the surface of our bodies, and this depends on the humidity of the air, its temperature, and most of all, on its movement.

This brings us to the consideration of a few practical points in the fresh-air treatment of pulmonary tuberculosis. It might seem wholly insufficient, from what was said, observes Brown, for a patient to be in bed with his head out of a window. In reality it is not so, but, in his opinion, it is far less effective than the full air bath. Spraying the upper part of the trunk with cold water in typhoid fever is certainly not so efficient as a complete sponge, but does some good. So with the window tent. It must not be lost sight of, however, that the room in which the body remains needs very careful ventilation.

A question which must be decided frequently is whether the roof or the back yard is the best place in which to take the fresh-air treatment. Brown does not hesitate to say that the roof should be used in every instance, where possible, for several important reasons. The number of bacteria, the quantity of dust, and the temperature of the air decrease directly with the elevation above the street, while the movement of the air increases. This leads to fewer secondary infections and to less irritation of the respiratory tract, and subjects the body to a far better hygienic environment. In summer, however, the roof may be too warm.

These newer ideas about fresh air throw grave doubts on the efficacy of "air carriers," and emphasize the necessity of life in the open, "living" air. His experience, after observing patients for ten years, does not lead him to believe that sleeping out of doors materially hastens recovery, provided eight to ten hours a day are spent in the open air and the night passed in a well-ventilated room. When, on the other hand, the patient returns to his indoor work, then sleeping out is very necessary. Ozone is said never to occur in rooms, however well ventilated, but it is of no value to man except as an indicator of the purity of atmosphere.

A man out of doors is said to be exposed to one hundred times more fresh air than he could get in the best-ventilated room in any given period of time. In any room bacteria are partially protected, while in the open they quickly die.

Sträube¹ cites, among other *indications for mountain climbing*, a defective development of the chest, and its musculature, convalescence after pneumonia, pleurisy and empyema, neuroses of all kinds, especially cardiac neuroses, anemic disturbances, and persons with constitutionally weak hearts, and with moderate weakness of the heart left from severe toxic and infectious processes. Naturally, the mountains are absolutely contraindicated in all heart affections in which the

¹ Deutsch. med. Woch., 1912, xxxviii, 145.

heart is already working with its reserve force. He does not regard age over fifty-five or sixty years as a contraindication; the atmospheric pressure is felt evenly on the tissues inside the body as well as on the exterior, so that all that has to be taken into account is the extra demands made on the arteries by the climbing. He regards it as established that more red corpuscles and more hemoglobin are produced, although not to the extent formerly assumed. He compares it to the whip applied to a sleepy horse, once started up the better functioning the blood-producing apparatus keeps on afterward at a better gait. The mountains had better be avoided when the organism is no longer capable of a reaction, as in pernicious anemia, although he cites some instances of surprising benefit even in this; one patient was a man, aged sixty-five years, with only 23 per cent. hemoglobin and 1,350,000 reds. After four months at St. Moritz, the hemoglobin had risen to 57 per cent., and the reds had nearly trebled. In the mountains there seems to be less tendency to the depositing of dead fat, while the production of living matter is promoted; consequently, a stay in the mountains is an excellent and harmless method of reducing obesity. He has had considerable favorable experience with diabetes, and urges further research on the influence of altitude on diabetes. The favorable action on nervous disturbances is well known, as also the most striking effect of all, that on asthma, especially the type with eosinophilia, which he calls the eosinophile diathesis. He adds that when everything else fails, a stay in the mountains may transform the metabolism and a cure result. He warns that persons on arriving are apt to be enticed to walk and climb beyond their strength at first, and become weak and nervous, but a day or so of reclining will bring them out of this "adaptation depression," as he calls it.

According to Young and Williams,¹ the outdoor treatment has reduced the mortality of severe *puerperal infections* by nearly 20 per cent. This treatment they believe probably exerts its action chiefly by increasing the amount of hemoglobin in the blood, therefore, sunlight is probably quite as important as fresh air. Curettage, they hold, is contraindicated in puerperal infection, because it increases the mortality nearly 10 per cent. A single intra-uterine douche of sterile salt solution should be the only local treatment. Antistreptococcic serum and vaccines have proved of much value.

Leonard Hill, who has given much time to the study of the physiology of respiration, points out that there are three properties of the air which have nothing to do with its chemical purity, *viz.*, temperature, movement, and humidity. These exert an action on the nerves and skin. When the air of a room is hot, moist, and still, it is unpleasant and enervating. Movement of the air undoubtedly cools by promoting evaporation, but this is not its only effect; it influences the cutaneous

¹ Boston Medical and Surgical Journal, 1912, clxvi, 399.

nerves, and thus affords a stimulus to the nervous system. This accounts for the comparative non-success of openings admitting air to a room and causing a circulation, but not impinging directly on the skin, which does not produce the same freshening effects as the open window. Many authorities now hold that the open window is the best means of ventilation. Perhaps it is not possible to have the windows always so placed in schoolrooms as to afford a thorough draught, nor may it be advisable to keep the windows of a school room open sufficiently long to provide all the ventilation necessary. On the other hand, on the open window the main dependence for the ventilation of schoolrooms must be placed, and, at least during the recreation time, windows should be thrown wide open in order that the air may be renewed as effectually as possible.

To determine the *action of hot weather on gastric secretion*, Salle¹ experimented with young dogs, keeping them in an incubator for a time at temperatures corresponding to the hot weather of summer. The gastric secretion was studied by means of a Pawlow fistula. His aim was to ascertain whether the heat had a special depressing action on the stomach functioning, and what changes it induced. The results reported and condensed in diagrams show that the secretory function is materially depressed by heat and dryness of the air; the secretion of gastric juice becomes less and less, as does also its digestive power. The dogs lost rapidly in weight, their temperature rose, and diarrhea and vomiting followed—in short, they presented disturbances remarkably like those of summer diarrhea in infants. The experience related confirms the danger from excessive loss of fluids during the hot weather, and the exaggeration of this danger when the air is unusually free from moisture. Some of the charts at the recent Hygiene Exhibition at Dresden showed in various countries how the highest summer infant mortality coincided with an unusual lack of moisture in the air. All the research reported emphasizes the necessity for supplying fluids to infants in hot weather.

Chloretone. Bickle² never operates under a general anesthetic if possible, without the previous administration of chloretone. The dosage is important. He invariably administers 15 grains in a capsule one and a half hours before the time fixed for the operation. Inquiry into cause of failures from this drug to prevent postanesthetic vomiting and discomfort, has generally been shown to be due to an insufficient dose. For dental cases and adenoids and tonsillotomy cases, he never gives the drug, as a little vomiting is useful in getting rid of swallowed blood. Bickle claims the following advantages for chloretone:

1. It lessens the patient's dread of the table.
2. The anesthetic is taken more quietly.

¹ Jahrbuch f. Kinderheilkunde, 1912, lxxiv, 617.

² Therapeutic Gazette, March, 1912.

3. Very much less anesthetic is required.
4. The patient is very quiet in coming to. There is no tossing and twisting about, and the quiet and absence of vomiting give physiological rest, and thus healing by first intention is facilitated, ligatures are less likely to slip, and bandages are not disturbed.
5. It minimizes shock in a remarkable way.
6. Nourishment can be freely taken as soon as the patient becomes fully conscious.
7. In operating in private houses less nursing assistance is required, and the nurse can straighten up, rough wash, and wipe instruments while the patient is calmly resting. She does not have to sit by with a bowl to prevent soiling of bedclothes by sickness.

Sometimes the drug causes a little dizziness before the operation. This is the only drawback that Bickle has ever found. He has never seen any trouble to the anesthetist. After ether particularly, some mucus may be thrown up, but there is no subsequent vomiting.

Chromosantonin. Begg and Maxwell¹ state that in the Medical Reports of the Chinese Maritime Customs for 1887, Begg published an account of cases of chronic diarrhea cured by the administration of santonin, and from time to time followed that paper up by others in various journals. Further experience made it clear that white or purified santonin was practically useless, and that the virtue of the drug lay in some change brought about by exposure to sunlight, or in some similar way. Another point which should be borne in mind is that chromosantonin is more efficient when administered in olive oil. For some reason not entirely clear, it is not as efficacious when administered by itself; and in some cases, possibly due to rapidity of elimination, may fail of the desired result.

In this paper the action of the drug as a vermifuge or vermicide is deliberately excluded. It is true that one may meet with chronic diarrhea due to the presence of the roundworm, and that these cases are at once amenable to santonin treatment, but the chronic tropical diarrhea which this paper discusses is a more serious matter. In its most common form it is called "sprue." Other cases simulate dysentery very closely, even if they be not caused by the known agents, the *Shiga bacillus* or the *Amœba histolytica*; and a further group are characterized by chronic diarrhea of the sprue type, but unaccompanied by any mouth symptoms whatever.

Codeonal. According to Gaupp,² codeonal appears to be a very efficient hypnotic in certain conditions that usually require morphine. Codeonal is a combination of codeine and veronal. It is especially applicable in cases where insomnia is due to pain or when there is distressing dyspnea or cough. It is an efficient hypnotic when it is given

¹ China Medical Journal, November, 1911.

² Berlin. klin. Woch., 1912, xlix, 306.

to replace a drug to which a patient has become accustomed. Gaupp says there are no untoward symptoms from its use. It is often of advantage to combine codeonal with sodium-veronal, giving the codeonal in a dose of 0.04 gram and the sodium-veronal in a dose of 0.3 gram.

Beyerhaus¹ endorses the use of codeonal as a narcotic in patients suffering from slight psychoses. Its effects are not so reliable as those produced by 1 gram of trional, 2 grams of chloral, or $\frac{1}{2}$ gram of veronal. Its indication, says Beyerhaus, is insomnia produced by severe coughing spells and bodily pains.

Bachem² has made experiments with codeonal on rabbits as well as on man. He says that codeonal consists of 11.76 per cent. diethylbarbituric of codeine and 88.24 per cent. diethylbarbituric of sodium; the codeonal tablets contain of the former 0.02 gram, and of the latter, 0.15 gram. He has not seen any important lowering of the temperature.

Digitalis. In a long article, Mackenzie³ reports 43 cases of various cardiac affections treated with digitalis. Each case is represented with the clinical details regarding, particularly, the effects produced by the administration of digitalis. Mackenzie draws the following conclusions from his detailed study of these cases: The careful analysis of the symptoms of patients to whom digitalis has been administered brings out the fact that individuals react differently to the drug. So far as the heart is concerned, the difference is partly dependent on the nature of the lesion with which the heart is affected. Patients with auricular fibrillation are more readily and more markedly affected than patients with the normal rhythm. Digitalis, in a proportion of patients with normal rhythm, affects the auriculoventricular bundle more particularly, producing partial heart-block. It is suggested that the susceptibility of patients with auricular fibrillation may result from the tendency of digitalis to affect the bundle, the change in the auricular condition rendering the bundle more susceptible to the influence of the digitalis. It is possible that, in slowing the heart's rate, the digitalis acts by stimulating the vagus nerve. Digitalis tends to induce auricular fibrillation. In 2 cases of tachycardia, arising from an abnormal source, digitalis caused the heart to revert to a normal rhythm, first inducing fibrillation of the auricle. The diuretic effects of digitalis may be produced with no perceptible change in the heart.

The *treatment of hemoptysis with digitalis* is discussed by Locke.⁴ He points out that hemoptysis may result from a number of causes other than tuberculosis. Among the most important of these causes he mentions anemia, arteriosclerosis, bronchial asthma, and acute

¹ Deutsch. med. Woch., February 29, 1912.

² Berlin. klin. Woch., January 29, 1912.

³ Heart, 1911, ii, 273.

⁴ Therapie d. Gegenwart, 1911, lii, 396.

catarrhal bronchitis. In many of these patients, the hemorrhage is due to a local congestion that favors diapedesis. Locke believes that the treatment should aim to reduce this local congestion, and, for this purpose, he recommends digitalis. He has had good results with this plan of treatment, but emphasizes the fact that an accurate diagnosis of the condition causing the hemorrhage is necessary before the treatment is instituted.

Dry Heat. Perlmann¹ reports the results in *treatment of eczema in infants* by the application of hot air by means of a cabinet. The results were excellent, not only in the moist form of the disease, but also in the dry forms, such as the papular, squamous, and vesicular. Most of the cases were infants who had been treated for some months without benefit, by means of the usual salves and ointments. They were considerably under weight, and were in constant distress from itching. After a few treatments, the itching and restlessness were markedly improved. During the course of the treatment the children gained in weight, the temperature became regularly normal, and all but the inveterate cases healed in a remarkably short time.

It was found that this treatment acted exceptionally well in cases of *furunculosis*. The furuncles dried up rapidly under the influence of the heat, and soon disappeared, and the further spread of the condition was stopped. A daily application of the hot air was given for from five to ten minutes. The eczematous areas were treated with olive oil between the hot-air treatments. Perlmann has treated 35 cases in the last six months. The time necessary to cure varied from seven days to three and four weeks. A strict regulation of diet was carried out in each case.

Ergot. In an editorial in the *Therapeutic Gazette* for January, 1912, the physiological and therapeutic action of ergot is discussed, and it is noted that of all the drugs which are employed for the purpose of producing immediate effects in the presence of grave emergencies, there are few upon which so much confidence is placed as ergot. There are also few drugs which produce results so variable, the chief reason for the variation depending upon the fact that crude ergot itself, and the various preparations of ergot, vary greatly in power. A large amount of research has been carried out in an endeavor to isolate the active principles of ergot with the hope that some means of standardizing it by chemical processes might be evolved, but the result of this investigation, from the chemical standpoint, has been to indicate that the full power of ergot depends not upon one active ingredient, but upon the combined action of several ingredients which, working together, produce better results than even the most active of them alone. Only physiological standardization is possible.

While it has been taught for many years that ergot stimulates

¹ Münch. med. Woch., 1912, xlix, 85.

contractions by acting directly upon the uterine muscle, it will be remembered that Hemmeter and others have apparently shown that it also affects the cells in the spinal cord which govern this organ, and Dale believes that its chief effect is exercised upon the myoneural junction—in other words, on the nerve endings in the muscle.

The writer discusses Sharp's¹ paper on the subject and calls to mind many points of interest in his communication. Some of these points serve to emphasize facts already recognized by American practitioners. Others are at variance with American views, and some of Sharp's results throw light upon subjects little understood. Sharp found that the fluidextract of ergot seemed to be the best preparation for clinical employment, and that it was active after being kept for thirteen months, and, furthermore, that the fluidextract is more reliable than any of the so-called solid extractives or active principles. He found that ergotoxin acted more rapidly than the fluidextract, and that it could be given hypodermically, but that ergotin was inert and useless.

The doses which he suggests of the fluidextract of ergot are, however, less than those which are commonly employed in this country. Sharp considers 30 minims an average dose, and 45 minims too large a dose, believing that full doses diminish, rather than increase, uterine contractility. In the treatment of abortions and ordinary uterine bleeding, he thinks that a dram of the liquid extract given in twenty-four hours is quite sufficient.

Attention is called to the fact that it is the custom to administer ergot as soon as it is evident that the birth is accomplished, or so nearly accomplished that the child will be expelled before the effects of the ergot can be exercised. On the other hand, there are some obstetricians who think that it should not be used as a routine measure, and with this class Sharp agrees, believing that only a small number of women in labor need ergot, the majority being best without it. He emphasizes the points, namely, that ergot should not be given unless the os is fully dilated, unless there is no obstruction, bony or otherwise, and finally, unless the soft parts of the birth canal and outlet are soft and yielding.

Sharp believes that ergot not only collects the small non-effective pains into larger effective contractions by improving the tone of the uterine muscle fibers, but that it also tones up the abdominal muscles, and the muscular system generally. Careful observations carried out by Sharp lead him to believe that if half a dram of the fluidextract is given in a small cup of hot tea, it acts far more rapidly than physicians commonly think—sometimes as soon as four minutes, and rarely as late as twenty minutes. He does not think that either morphine or opium in any way inhibits or interferes with the action of ergot. An ordinary dose of laudanum may diminish the patient's voluntary

¹ Proceedings of the Royal Society of Medicine, May, 1911.

efforts, but does not decrease the activity of the uterus under ergot, according to this observer, nor does he think that the administration of chloroform, in the quantities suitable in parturition, impairs the action of ergot on the uterus.

Schmid¹ reports a case of severe complications on account of the administration of ergot before the placenta has been expelled. He cites 7 similar cases from German literature. In his case, delivery had been normal; two hours later the cervix permitted passage of two fingers, and there had been considerable hemorrhage, but no signs of severe anemia, no dizziness or fainting. As there seemed to be no change in these conditions, in a few hours the physician gave ergot and sent the patient to the hospital, where the cervix was found nearly closed. By this time fifty-five hours had elapsed since delivery of the child, and there was a slight rise in temperature. After introduction of the inflatable bag for a few hours, the placenta was evacuated by hand and the patient soon recovered.

Eucalyptus. Koerber² reports the results obtained in the Eppendorf Hospital with *eucalyptus oil treatment in scarlet fever*, as practised by Milne, of London. Milne applies twice daily for the first four days, the pure eucalyptus oil to the entire body surface, and repeats this once daily for the following six days. He also applies a 10 per cent. solution of carbolic acid in oil to the tonsils every two hours for the first two days. His patients are not isolated, and he claims no contagion to unprotected children resulting either during or after the disease.

In an epidemic, in Eppendorf, the cases were divided as to treatment for the sake of comparison. There were 274 cases treated in the usual manner, and 151 with the method of Milne. Infection was transmitted by cases returned to their homes as cured in the following proportions. In 86 cases not treated with eucalyptus oil, it occurred 3 times, or 3.5 per cent. In 73 cases treated with eucalyptus oil, it occurred 4 times, or 5.5 per cent. Those cases only were reported where the family could be under close observation constantly, thus ruling out infection from other sources. The mortality was only 0.56 per cent. less in the eucalyptus series. It was noteworthy, however, that the complications of endocarditis, nephritis, glandular suppuration, and otitis media were 50 per cent. less frequent in the eucalyptus series than under the ordinary treatment. The joint complications, however, were more frequent. A shortening of the course of the disease with the eucalyptus treatment was not observed. The period of infectivity was not shortened, one of the return cases infecting the family three months after the primary onset. In view of this experience, the author does not think Milne's claims are convincing.

¹ Münch. med. Woch., lviii, No. 38, 1912.

² Ibid., lix, 581.

Eucerin. Unna¹ mentions eucerin as being the actual binding constituent of lanolin. The latter, when deprived of eucerin, loses its power for binding water, while pure eucerin can absorb up to 700 per cent. of water. It is odorless and not sticky, can be sterilized, and kept permanently, and is as easily rubbed in as lard. An ointment can be made which contains 400 per cent. of glycerin. Eucerin may be applied equally to the skin and mucous membranes and is also used in subcutaneous injections with salvarsan and mercury salicylate. Combined with liquor aluminis, liquor plumbi, witch-hazel, or chamomile, it acts well in moist affections of the skin, while in dry diseases it is used pure, or in a glycerin ointment.

Anhydrous eucerin should be distinguished from eucerin containing water. The latter can be mixed with all common drugs—zinc, bismuth, iodine, lead, etc.—while anhydrous eucerin is best employed as a basis for reducing agents, *e. g.*, ichthyol, resorcin, pyrogallol. Pure eucerin may be used in treatment of ichthyosis.

Jackson² found this agent excellent for various forms of cutaneous disease in which the skin was dry. Thus it is useful in chapped hands and similar conditions of the skin. He usually combined it with cold cream ointment, about 3 drams to an ounce, which proportions make a desirable ointment. It is useful upon the scalp in cases where a distinctly greasy application is not desired. It does not become rancid.

Glandular Extracts. The glands of internal secretion are assuming more and more importance in medicine. Attention is now being especially directed to the milder forms of hypo- and hyperactivity of these glands.³

CORPUS LUTEUM. Jaeger⁴ reports a series of cases in which he employed extract of corpora lutea in several varieties of ovarian disorders. He states that the annoying symptom-complex associated with induction of the artificial climacteric is one of the unfortunate circumstances following the removal of both ovaries, and more rarely and to a minor degree, that of one.

Endeavoring to overcome this troublesome postoperative phase, Jaeger began about two years ago to investigate and then experiment with the extract of the entire ovarian substance, and also with extract of corpora lutea. The effects from the entire gland preparation were not encouraging, but so gratifying were those following the use of corpora lutea extract that it was also used in disturbances coincident to the normal menopause, and in derangements depending, in his opinion, upon ovarian disease resulting in decreased or perverted function of these glands. The following groups represent 51 cases treated with corpora lutea:

¹ Proceedings of the Royal Society of Medicine, March, 1912.

² Journal of Cutaneous Diseases, June, 1910, p. 294.

³ Journal of the American Medical Association, November, 1911, p. 1840.

⁴ Therapeutic Gazette, July, 1912, p. 461.

SUMMARY OF CASES.

No. of cases.	Type of case.	Cured.	Improved.	No effect.	Worse.
11	One ovary removed	6	2	3	
9	Both ovaries removed	4	2	1	2
14	Menopause.	6	2	6	
	Total	16	6	10	2
17	Ovarian disease, no operation .	5	2	10	

In all the cases included in these four groups, corpora lutea was administered in 5-grain capsules three times daily.

In the last group, none of the cases were absolutely cured, but the condition was decidedly improved. In a few days after the ingestion of this preparation, vascular stimulation was observed in each to a greater or less extent, and usually disappeared after a state of tolerance had been reached.

In some cases, decided flushing of the face occurred, or an increase of the same where it had previously been present. In 2 cases, tinnitus aurium occurred, and in 14 cases varying degrees of dizziness. In 1 case tachycardia developed to such an extent that the drug was discontinued. In about 17 of all the cases the pulse rate rose from 80 to 90 to 110 to 132. In the rest of the cases the increase of rate and tension was not so marked. In most of the cases there was an improvement in the general condition, as in appetite, sleep, etc., though in all cases it should be understood general treatment was also given.

Brouin and Ancel¹ sum up their studies of the relations of the corpus luteum and the mammary gland with the statement that the corpus luteum is a gland of internal secretion which governs the development of the mammary gland both during pregnancy and in its absence. In mammals which have no spontaneous ovulation, there is normally no corpus luteum except during pregnancy, and the mammary gland develops only during that period. In women and in other mammals with spontaneous ovulation, on the other hand, alternate enlargement and diminution of the mammæ are observed, which correspond with the intergestational development of corpora lutea. These mammary crises manifest themselves from the beginning of puberty to the end of sexual life, in the course of the menstrual period in woman and during the heat in animals.

The mammary gland is, therefore, an organ under the influence of the corpus luteum outside of pregnancy and during the first half of gestation. The corpus luteum stimulates growth of the organ, but cannot induce secretion. The latter function is probably due to a hormone introduced into the maternal blood during the latter part of pregnancy. The authors advance the hypothesis that this hormone is the product of a gland which they have discovered in the uterine muscle, and to which they give the name "myometrial gland."

¹ Revue de Chirurgie, Paris, 1911, xxxi, 1 to 212.

Glycerin. Rusca¹ seeks to revive *glycerin as a dressing for wounds*. Its water-attracting power serves to reduce the congestion in the region, while it keeps the wound clean by taking up the secretions and softening the necrotic tissue and crusts so that they can be readily removed, thus depriving the germs present of their favorite nests. Glycerin has also a slight sterilizing action which might be enhanced by the addition of some disinfectant. There cannot be the slightest danger from the use of glycerin, he continues. As even taken internally in large doses there does not seem to be any toxic action. He saturates a compress with official glycerin, and applies it to the lesion, covering with an air-tight cover, and changes the dressings twice a day. He has obtained excellent results with this technique in 100 cases of various local infectious processes, the lesions soon clearing up and healthy granulation following, except the tuberculous lesions; these do not seem to be influenced. The glycerin dressings are free from the coagulability action on albumin, which is one of the disadvantages of alcohol dressings.

Lucas-Championnière has recommended the following phenol-glycerin combination:

R—Phenol,		
Glycerin	āā 50 grams.
Sterile water	1000 c.c.

This fluid should be used hot, and applied to the involved surfaces without preliminary cleansing irrigation of the latter.

Besnier advocates the use of the following mixture:

R—Tannic acid		
Glycerin,	0.1 gram.
Rose water	āā 50.0 c.c.

In localized hyperidrosis, glycerin should always be included in the preparation prescribed, if the latter contains formaldehyde in high percentage.

In nasopharyngeal affections, the application of glycerin is a well-known and effective measure. To it may be added tannic acid, sodium biborate, alum, a salicylate, or formaldehyde.

On many occasions, the glycerite of starch may be substituted for pure glycerin with advantage.

Glycocoll. Under the heading of "The Diuretic Action of the Amino-acids," Glaesner² describes glycocoll, and says that it has a marked diuretic action in cases where there is passive congestion due to hepatic or cardiac disease. This diuretic effect is also observed in many cases of renal disease, but is not nearly so marked. Cases of liver disease with a diminished output of urine are most remarkably influenced by

¹ Corresp.-Blatt. f. Sweiz Aerzte Basel, 1911, xli, 737.

² Therap. Monats., 1911, xxv, 479.

the action of the remedy. Better results are obtained with glycocoll in dropsy due to cardiac incompetence if the remedy is combined with cardiac stimulants.

The diuresis resulting from the action of glycocoll consists not only of an increase of water excreted, but there is also an increase in the solids of the urine. The specific gravity of the urine is increased, and the amount of urea and the chlorides are higher. Glaesner says that glycocoll is an entirely harmless remedy, and it is not unpleasant to take. The usual dose given by the author is 5 grams a day. The only disadvantage of the remedy is that it is more expensive than other diuretics.

Guaiaicol. In his experimental work, Nürnberger¹ failed to show any bactericidal effect from guaiacol and Fowler's solution, alone or together, on the tubercle bacilli in glycerin-agar cultures, while the course of tuberculosis in rabbits and guinea-pigs did not seem to be modified in the least by them.

Heliotherapy. Direct *sunlight treatment of surgical tuberculosis* as advocated by Rollier has attracted considerable attention in recent years. Witmer and Franzoni² report from Leysin, Switzerland, the experiences at Rollier's private sanatorium in the treatment of surgical tuberculosis. Their communications are preceded by an article from de Quervain describing the working out of the method of sunlight treatment during the nine years since Rollier first sought to apply it systematically. Witmer describes some typical cases of tuberculous processes in the shoulder, elbow, wrist, spine, pelvis, hip-joint, knee, and ankle, with other cases in which the long bones were involved, or the glands, peritoneum, urogenital apparatus, etc.

He cites 456 cases of these various groups with only 23 out of the total in which no benefit was realized. It is evident, he declares, that such results as he reports will do much to restrict operative measures in extrapulmonary tuberculous processes. They should be applied only when it is positive that the focus is an isolated one, and when it is certain that every trace of diseased tissue can be removed. Franzoni discusses in particular the influence of the heliotherapy on tuberculous processes with sequesters, giving detailed descriptions of 5 particularly severe cases, the outcome confirming, he states, that heliotherapy in sequester production with fistulas is the most ideal treatment known to date.

Austin³ describes her visit to Rollier's hospital at Leysin, where little tuberculous children are exposed for hours daily, without clothing of any kind, to the sun's rays in midwinter at an altitude of 5000 feet. The body of the patient is exposed to the sun's rays in galleries open-

¹ Münch. med. Woch., lviii, No. 50, 2649.

² Deutsch. Zeitschr. f. Chirurgie, 1912, cciv, 301.

³ Medical Record, New York, June 8, 1912.

ing into wards and facing the south. The actual seat of the disease is uncovered for five minutes only the first day, that the skin may not be burned or blistered; the next day the region is treated for two periods of five minutes each, separated by an interval of half an hour; and on the third day these exposures are extended to fifteen or twenty minutes. Each time a larger area of skin is exposed, so that by the end of the week or ten days the entire body, the head excepted, is lying nude in the sun; later the head, too, is uncovered. The large windows of the steam-heated wards are never closed, even at night. A carefully studied diet aids the building-up process. Rollier does not concentrate any one ray (Finsen), but uses diffused white light just as it comes from the sun.

Spitzmüller and Peterka¹ have been applying heliotherapy as an adjuvant to other measures in treating the children at the public children's hospital in upper Austria. They were unable to detect any marked influence from the sunlight treatment; the children from the Vienna slums threw off their tuberculosis in the pure country air and with good food, regardless of whether they were given systematic exposures to the sunlight or not. They urge that classified records be kept this coming summer of patients treated by the ordinary measures alone and plus the heliotherapy, and by the heliotherapy alone, with care to class the patients according to their former environment, the results of any treatment being far more marked among slum children than in those from the homes of the well-to-do.

RED LIGHT IN TREATMENT OF PLEURAL EFFUSION is utilized by Kuttner and Laqueur² to induce hyperemia in the depths, and to promote absorption of effusion. They apply the light from an arc or incandescent lamp, passing it through red glass to exclude the chemical rays. Experiments on animals proved the efficacy of the measure, although the effect was much more marked in clinical cases, as the human skin bears the exposure better. They report the details of a few cases from their experience. The red-light exposure is for twenty or thirty minutes a day; at the close of the sitting, the skin of the region shows considerable hyperemia. The method is applied as an adjuvant to the usual measures for pleurisy with effusion.

Chamberlain and Vedder³ show by their experiments that, in a water supply, the amebas, whether motile or encysted, may be killed by a comparatively short exposure to ultraviolet rays. Balantidia also appear to be destroyed by the same agency. These facts afford a potent argument in favor of the use of these radiations in the practical sterilization of water in the tropics.

¹ Wiener klin. Woch., 1912, xxv, 735.

² Therap. Monats., Berlin, 1912, xxvi, 1 to 88.

³ Philippine Journal of Science, November, 1911.

Heroin. Fraenkel¹ is of the belief that cardiac dyspnea is primarily due to a passive congestion of the pulmonary circulation; this congestion, he claims, produces an overdistention of the alveolar capillaries, and consequently, a diminution in the size of the alveolar spaces. As a secondary effect of the pulmonary congestion, swelling of the mucous membrane of the finer bronchioles occurs, and the lumen of the finer bronchial tubes is often further diminished by spasms of the bronchial musculature. Fraenkel claims that morphine acts very favorably upon all these causes of the dyspnea, and hence its therapeutic effect in cardiac dyspnea is usually remarkable. Morphine, however, is open to the objection that it does not act so favorably when its use is long continued. He therefore recommends heroin as a substitute for morphine on the ground that heroin has the distinct advantage that it may be given daily for periods of weeks without losing its beneficial effects. The initial dose given by Fraenkel is 0.005 gram, and it may be increased to 0.015 gram. It is often of distinct advantage to combine the heroin with some form of digitalis or other cardiac tonics.

Brooks and Mixell² report 2 cases of heroin habituation. The authors believe that the prevalence of the habit is steadily growing, especially since there is now a greater difficulty in obtaining, without prescription, preparations containing the more active opium compounds. From the statements of their two patients, there is a certain sense of stimulation and well-being induced by heroin which surpasses in its delight that experienced from morphine. They assert that the habit is quite common among their associates. Apparently, judging from these two instances only, the immediate habit is broken with much less suffering and greater ease than morphinism or cocainism, and the pathological and physiological effects are much less serious than in the more frequent habits.

In two patients, both doctors, who have been under my care, the habit was comparatively easily cured.

Hexamethylenamin. H. A. Hare³ calls attention to the fact that one of the advances made in therapeutics during the last two decades has been the introduction into medicine of one or more substances which, comparatively harmless to the body of the patient, nevertheless inhibit the growth of pathogenic organisms which may have invaded that body. The most important of these, aside from the specific remedy, salvarsan, is without doubt hexamethylenamin, commonly called *urotropin* or *uritone*. Considerable divergence of opinion has existed as to the manner in which it acts as an antiseptic in the genito-urinary tract. It is commonly believed that the drug is decomposed in the kidneys, or in the urine as soon as it is excreted, and that

¹ Therap. Monats., 1912, xxvi, 14.

² New York State Journal of Medicine, August, 1911.

³ Therapeutic Gazette, June, 1912.

formaldehyde is set free, which acts as formaldehyde or combines with any sodium which may be present forming a sodium compound.

Hare calls attention to the most recent investigation on this subject by Jordan in the *Proceedings of the Royal Society of Medicine.*" The doses that he employed were 10 grains three times a day, either alone or in conjunction with acid-sodium phosphate or potassium citrate. He found when pathogenic organisms were present that the disinfectant or germicidal influence of urotropin amounted to little or nothing if the urine was alkaline or faintly acid, but became very powerful if the urine was rendered distinctly acid by simultaneous administration of acid sodium phosphate. Conversely, that the simultaneous use of potassium citrate, whereby the urine was made alkaline, diminished the antiseptic power of urotropin. It would seem probable, however, that this rule does not apply to those cases in which the colon bacillus is the cause of the genito-urinary infection. Indeed, it is possible that urotropin does best in this infection when the urine is alkaline, possibly because an alkaline urine is less favorable to the growth of the colon bacillus than is the urine with an acid reaction. Hare points out that it has been known to practical therapeutists for many years that urotropin does best in cases of vesical irritation and inflammation, not dependent upon distinct infection, when the urine is alkaline and loaded with phosphates, since it tends to make the urine acid; and conversely, it may increase bladder irritability if the urine is excessively acid. The conclusion to be drawn, he states, would seem to be that it is important in the treatment of these cases, first, to determine whether the trouble is dependent upon the presence of an infecting organism, then to determine the reaction of the urine, and if it be alkaline to administer acid sodium phosphate, or perchance, bitartrate of potash, to increase the urinary acidity if ordinary pathogenic germs are present.

Vanderhoof¹ recommends hexamethylenamin as a remedy of great value in cases of *acute colds*, and in patients suffering from acute and chronic bronchitis. The drug should be given in large doses, accompanied by the copious drinking of water. In the ordinary cold, treatment with hexamethylenamin shortens the stage of coryza and greatly modifies or entirely prevents the succeeding bronchitis. He also believes that it acts as a prophylactic against ensuing infection of the accessory nasal sinuses. Vanderhoof says that it is our best remedy in acute bronchitis. Certain cases of chronic bronchitis respond to treatment by hexamethylenamin with a gratifying alacrity, while others do not. In the latter instance it is presumed that structural changes have occurred in the walls of the bronchi, associated with thickening and calcification of the cartilages, fibrous membrane, and muscular coats so as to preclude the hope of successful treatment by any remedy.

¹ Journal of the American Medical Association, 1912, lviii, 331.

Hydrotherapy and Mineral Springs. In PROGRESSIVE MEDICINE for 1911, I discussed hydrotherapy in its different phases at some length. This year several interesting papers have appeared on the same subject.

Cahn¹ mentions a number of minor points in the technique, neglect of which detracts from success. Cold sponging was always done by two persons, one sponging off the limb, and the other wiping it dry at once, always beginning each sponging with the face and neck, and working downward, repeating this from two to four times. All unnecessary movement of the patient was avoided, as an elderly pneumonia patient is liable to dyspnea and collapse if moved much. The physician should aid or superintend the first sponging to note how the pulse, respiration, and temperature behave under it. Cold water, frequently renewed, is used for robust patients, but for the weak and elderly, water at room temperature. In applying a cold pack, no space must be left where hot, moist air can accumulate. The wet cloth must envelop every surface, being tucked around each leg separately. The anus should be drawn up while the pack is applied to the trunk. Cahn states that, in typhoid, Kussmaul did not apply the Brand baths so cold or so often as most others. The temperature of the water was 25° or 30° C. (77° or 86° F.), and the baths were given every two or four hours from the late afternoon till late in the evening, but not at night. With severe cerebral symptoms he sprinkled cold water from a watering pot on the head and neck, placing the patient across the bed face downward, the outstretched arms resting in a bath tub, with a rubber sheet fastened at the back of the neck. This aroused the patient from his stupor, he swallowed, and fluid could then be given him, and he breathed better thereafter. This sprinkling in connection with warm baths has proved useful also in sporadic cerebrospinal meningitis.

Newton,² in his observations on the value of *Nauheim baths in nephritis*, with high blood pressure, remarks that just how these baths affect the kidneys is not at this time thoroughly understood. They do cause a relaxation of the entire muscular tissue, as evidenced by the fact that, after taking from four to five baths, patients are unable to do more than a small percentage of the walking or other exertion of which they were capable before beginning the baths. The baths also relax the peripheral circulation, and this effect may, and possibly does, extend to all tissues of the body.

Nauheim baths also cause marked elimination, especially through the skin and kidneys. Newton has often seen patients who came to Nauheim with a skin as dry as a sheet of parchment, after two, three, or four weeks of bathing, have an active skin. Indeed, many of these patients remark that they have not perspired for years, even on exertion, but that now, after taking the cure, they perspire easily. This increased

¹ Therapie der Gegenwart, 1912, liii, No. 5, 193.

² American Journal of the Medical Sciences, April, 1912, p. 578.

elimination through the skin doubtless is no inconsiderable factor in lessening albuminuria and lowering blood pressure.

Duverney¹ treats *sciatica* by various methods of applying the hot mineral waters of Aix les-Bains, commencing with the simplest and going on to the more powerful hydrotherapeutic measures at need. By this means he has cured or materially relieved 80 per cent. of 81 patients and among 36 traced to date only 5 were found not improved or cured; there had been a relapse in 5 other cases.

Comstock² says that the *Saratoga mineral springs* are divided for therapeutic purposes into the alkaline and saline group. They vary in strength, and some of them contain sufficient iron to be of value medicinally. There are also sulphur springs. To obtain the best results in using waters it is obvious that no hard and fast rules can be laid down, but it is essential that they should be drunk at the spring itself to get them at the temperature at which the waters leave the earth, and in their freshest state when they are not only more efficacious, but more palatable.

A proper discrimination must be made in prescribing the waters, for, like any drug, they may produce harm as well as good, and it is only in those cases to which an individual water is adapted and properly taken, that we can expect to see the wished-for result. Indiscriminate drinking, especially indiscriminate mixing, has done much harm in causing severe headache, loss of appetite, intestinal irritation with diarrhea, and a feeling of general malaise. Comstock cites instances to illustrate what the water can do for certain patients.

Inulin. The value of inulin as a foodstuff was studied by Lewis,³ who reports experiments undertaken to determine the value of inulin as a substitute for starch in the diet. Inulin occurs in the roots of many plants, particularly in the artichoke, elecampane, dandelion, dahlia, and other similar plants. The feeding of these vegetables has been advocated by many as a substitute for starch in the dietary of diabetes. This recommendation is largely based upon the fact that the administration of these vegetables causes no increase in the amount of sugar in the urine. Strauss reports the feeding of pure inulin with much benefit in 2 cases of diabetes. Pure inulin is very expensive and difficult to obtain, and hence its use is not practical. Certain observers have claimed that inulin produces no increase in the sugar excretion because it is not absorbed. Neubauer found, in a case of levulosuria, no increased levulose content of the urine after feeding 80 grams of inulin. If inulin were converted in the body to levulose, then a large increase in the levulose content of the urine was to be expected. No inulin was found in the feces, but the patient observed a strong gas formation in

¹ Lyon Médical, Lyons, 1911, cxvii, 50, 1268.

² New York Medical Journal, 1912, xcv, No. 1, 1 to 52.

³ Journal of the American Medical Association, 1912, lviii, 1176.

the intestine during the period following the meal, indicating bacterial decomposition of the inulin. The colon bacillus and other intestinal bacteria decompose inulin without the production of sugar. Lewis says that the facts he obtained in his experiments seemed to indicate that any utilization of inulin can occur only after hydrolysis by the gastric juice. The extent of this hydrolysis must vary with conditions in the stomach. If the diet is of such character that it leaves the stomach soon, the action of the acid gastric juice is checked by the intestinal reaction before the inversion of inulin can proceed far. The acidity of the gastric contents also must influence the rate of inversion. The character of the diet and the individual peculiarities both play a role here. Hence the percentage utilization of inulin for any individual must vary and cannot be determined except by experiment. Any inulin which leaves the stomach unchanged is liable to escape utilization and undergo bacterial decomposition in the intestine, a decomposition which results in no formation of carbohydrates. Any inulin which escapes this bacterial action is probably eliminated unchanged in the feces. In view of these facts, as well as the inability to administer more than comparatively small quantities, the value of inulin as a significant source of energy in human dietaries must be questioned.

Ipecac. Frazier¹ used ipecac in 6 cases of typhoid fever with good results. For instance: Woman, aged forty-four years. She was seen first on the third day after becoming confined to bed; the case was diagnosticated as typhoid on the sixth day of illness. Widal test being positive. At 8 P.M. of the sixth day she was given 30 grains of pulverized ipecac in salol-coated capsules; the room was made dark, and she was required to lie on her right side for two hours, so that the capsule might pass out of the stomach as quickly as possible. In this way vomiting was prevented by getting the ipecac past the stomach without coming in contact with the stomach wall. On the seventh, eighth, and ninth days ipecac was given in the same manner, the dose being decreased 5 grains each day; on the ninth day the dose being 10 grains. On the tenth, eleventh, and twelfth days the dose was 10 grains each day. The highest temperature recorded was 103.8° F., on the seventh day. The highest recorded on the eighth day was 99.6° F. There was no elevation of temperature after the ninth day. The ninth day of her illness was the fourth day she was given ipecac. The remaining cases were treated similarly. Frazier says it is necessary that each fecal discharge be carefully examined to find whether or not any of the capsules pass without being dissolved.

Iron. The comparative results obtained by the treatment of chlorosis with iron and arsenic alone with those obtained by treatment with iron and arsenic combined is discussed by Zwetkoff.² He arrives at

¹ Medical Record, New York, November 4, 1911.

² Zeitschr. f. Exper. Path. u. Therap., 1911, ix, 393.

the following conclusions: The treatment of chlorosis with arsenic in the form of arsenous acid, either given by mouth or subcutaneously, does not result in an increase of the hemoglobin or of the number of red blood cells. The action of arsenic in chlorosis is in direct opposition to its effects in pernicious anemia. In the latter, the arsenic treatment is of the highest value. The difference of action of arsenic in these two diseases of the blood-forming organs is dependent upon some difference in the nature of the two diseases. The treatment of chlorosis with iron in the form of Blaud's pills results in a rapid increase of the hemoglobin, and when the blood cells are diminished an increase in their number. This regeneration of the hemoglobin and of the red blood cells is not rapid as measured by the single weeks. The treatment of chlorosis with iron and arsenic combined gives a definitely increased improvement in comparison to the results obtained by the treatment of chlorosis with iron alone. The increase of the hemoglobin occurs more rapidly, and the number of red blood cells shows an increase of two or three times that obtained when iron alone is used. The arsenic is given in the form of arsenous acid, in doses of from 0.002 to 0.003 gram three times a day. These doses are combined with the ordinary doses of iron. Zwetkoff believes that the increased benefits derived from this combination of iron and arsenic is not only a question of the added action of arsenic to iron, but that it is to be explained on the ground that arsenic directly stimulates the bone marrow, that is being coincidentally supplied with iron, to increased blood production.

Heubner¹ suggests that in chlorosis the ability to reduce the higher salts of iron, the ferric salts, to the lower bivalent forms of iron, the ferrous salts, is lost. The iron in the food is in the form of the higher salts, and chlorotic subjects are not able to assimilate it. He believes that the empiric use of Blaud's pills, of syrup of ferrous iodide, and certain natural mineral waters that contain iron in the bivalent form is justified upon the basis of this hypothesis. The clinical fact that these preparations are particularly useful in the treatment of chlorosis tends to strengthen the theory as advanced by Heubner. On the other hand, the therapeutic effects of iron preparations, such as ferratin, ferrum, oxydatum saccharatum, and hundreds of proprietary preparations have often been disappointing. This, according to Heubner, is due to the fact that these are all the higher salts of iron, and the chlorotic subject is incapable of reducing the iron to a form suitable for absorption.

The subcutaneous injections of cacodylate of iron, sodium cacodylate and arsacetin, for the treatment of secondary anemia in pulmonary tuberculosis, is reported by Barlow and Cunningham.² Twenty-eight patients were treated, and the tabulated results are recorded and compared with patients not receiving the treatment. They also give

¹ *Therap. Monats.*, 1912, xxvi, 44.

² *Journal of the American Medical Association*, 1911, lvii, 1435.

the indications and contraindications for the treatment in detail, and the choice of preparation for the individual case. They believe that the following conclusions regarding the treatment are profitable. The subcutaneous or intramuscular injection of sterile solutions of arsenic or iron, or of the two in organic combination, is entirely practicable in the treatment of the tuberculous in sanatoriums. The effects of such medication are seen chiefly in the changes in the blood and in the body weight. The preparations of iron seem to affect the hemoglobin content more profoundly than it does in the number of red blood cells. The preparations of sodium cacodylate and of atoxyl (arsacetin) seem to affect the number of red cells more markedly than the hemoglobin. These solutions are in no sense specifics against the tubercle bacillus, but seem to exert a general tonic or alterative action within the organism. The use of these preparations is entirely safe, and is not attended with dangers to the patient, even when continued over a period of many months. Relatively larger doses are borne when given thus than are tolerated when given by the mouth. The dosage is capable of exact control and the amount of the drug absorbed is known definitely. The body weight is more rapidly and more certainly raised when these preparations are employed than when the unassisted hygienic dietetic form of treatment is maintained. There is no demonstrable increased liability to pulmonary hemorrhage accompanying the use of these preparations in pulmonary tuberculosis, even with advanced cases, and in the presence of progressive destruction of the lung.

My own experience with the treatment of the anemias occurring in tuberculous patients is that drug treatment is rarely needed. If the anemia does not disappear, however, iron, in the form of Bland's pill, is most effective.

Lecithin. Bain's¹ clinical experience leads him to look on lecithin as a valuable drug in cases of anemia and debility. He regards it as a metabolic stimulus, for he can hardly conceive that the small amount of extra nitrogen and phosphorus administered in doses of a few grains daily can act as a tissue-former in any substantial degree. Its beneficial effect on the nervous system he regards as secondary to improvement in general nutritive condition, and not because lecithin is a "brain-food." Its most striking effect is seen in the blood, the red corpuscles, white corpuscles (especially the lymphocytes), and hemoglobin percentage all being increased. Illustrative experiments in rabbits are given in detail. Although there is some evidence that phytin (inosite phosphoric acid ester), an important phosphorized constituent in vegetable tissues, may be of some value in herbivora, Bain says the evidence in favor of its utilization in carnivora and in man is either negative or conflicting. His experiments on rabbits were not sufficiently encouraging to warrant him in testing its usefulness clinically. The

¹ *Lancet*, London, 1912, i, No. 4623, p. 911.

enzyme phytase responsible for cleavage of phytin, though present in plants, appears to be absent in animals; he suggests that it is therefore probable that if cleavage occurs in animals it is due to phytase contained in the food taken. The paper also discusses such questions as the comparative therapeutic value of inorganic and organic compounds of phosphorus, and the possible way in which minute quantities of certain constituents of the diet may influence nutrition.

Kimura and Stepp¹ report researches which sustain the statements of others, to the effect that the ether-soluble phosphorus in the blood is increased in certain diseases. It was much below the normal average in exophthalmic goitre, nephritis, and heart disease. The concentration of the serum seems to influence the lecithin content.

Magnesium Sulphate. Parker² reports 3 cases of tetanus which recovered following the use of magnesium sulphate, preceded by antitetanic serum, to neutralize any toxin in the system not already combined with the motor ganglions. In a patient, aged eleven years, he gave 8 drams of a 25 per cent. solution of magnesium sulphate subcutaneously. Injections continued every two hours until spasms ceased, then once daily for one week. To a baby, aged twenty months, he gave doses of 4 drams of the same solution, and to an adult 10 drams. The prompt relaxation shows the value of the remedy. It has no specific action, but by quieting the excessive muscular action it allows the patient to rest and to take food, thus tiding him over while he is preparing his own antitoxin.

Menthol. Menthol is so largely used in medicine for various purposes, and so rarely produces disagreeable effects that it is rarely thought of as a substance which may possibly exercise an evil influence. Leroux³ has reviewed the literature of this subject extensively, and presents evidence to the effect that menthol is not always the harmless substance which it is thought to be. Indeed, he shows that the accidents from its use may vary from very mild untoward effects to those which are extremely grave. For example, in a newborn infant, for the purpose of facilitating nasal respiration and so permitting the child to freely nurse, there was introduced into the nares a drop of oil containing 1 per cent. of menthol. The child immediately appeared asphyxiated and cyanotic, the pulse became imperceptible, and it was only after the child had been inverted and energetic friction and artificial respiration resorted to that the dangerous symptoms disappeared, after the expulsion from the respiratory passages of a considerable quantity of mucus. A somewhat similar train of symptoms was also observed in a child, aged one month, who had been given menthol in the same way, except that the circulatory failure resembled the untoward effects produced by chloroform.

¹ Deutsch. Arch. f. klin. Med., November, 1911.

² Journal of the American Medical Association, lviii, No. 23.

³ La Presse Médicale, 1912, xx, 113.

Altogether Leroux gives references to no less than thirteen articles by different contributors to this subject. Most of the cases reported have occurred within the last two or three years. Some of them have not only had obstruction of respiration accompanied by an excessive secretion of mucus, but there has also been evidence of spasm of the glottis with cyanosis, convulsive movements and syncope, and one case reported by Gamet, a child, aged one month, having received in the nostrils vaselin menthol of 2 per cent. strength, very shortly developed intense dyspnea. In other instances which he quotes the symptoms were by no means so grave as those already cited, but consisted in marked pain in the nose, the result of intense irritation set up by the drug. In one instance an intense conjunctivitis developed. In still another such an intense inflammation of the skin of the face occurred as to make it resemble erysipelas; there was thickening of the skin, tumefaction with redness, and violent headache.

He has seen several patients in whom the too free use of methol locally in the nose, apparently produced a herpetic eruption. Finally, Leroux points out that certain patients seem to develop a condition of "mentholism," which is analogous to cocaineism or morphinism, in that the patient continually inhales the menthol vapor in order to get relief from nasal congestion, and that this produces a constant irritation with hypertrophy of the nasal mucous membrane, which can only be relieved by galvanocautery or turbinotomy.

Nuclein. Redfield,¹ after quoting Vaughan's studies on the effect of nuclein on the multinuclear white cells of the blood and a rather extensive and on the whole promising clinical experience, decided to try the effect of the nuclein solution as a local dressing for certain infected wounds. The first case thus treated was that of a printer, who had fed his index and second finger into the press, which produced severe crushing of the first phalanx. The wounds were washed slightly and dressed with sterile gauze soaked in nuclein solution, full strength. Five days later, the dressing having been kept soaked with nuclein solution, the wounds were completely healed. A number of other striking cases are quoted. As a result of his favorable experience, Redfield recommends nuclein as a dressing in wounds in which infection is to be expected.

Phenolsulphonephthalein. Geraghty and Rowntree² give a detailed account of their experience with the phenolsulphonephthalein test for estimating renal function, and refer to their previous communications on this subject. This drug, which was first prepared by Remsen, is a bright red crystalline powder somewhat soluble in water and alcohol, but readily soluble in the presence of alkalies. The drug as determined by Abel and Rowntree is non-toxic, excreted with extraordinary rapidity, and appearing in the urine normally within a few minutes of

¹ New York Medical Journal, October 14, 1911.

² Journal of the American Medical Association, 1911, lvii, 811.

injection. In alkaline solution a brilliant red color is produced, which is ideally adapted for quantitative colorimetric estimations. The author, after giving the technique, describes various pathological states of the kidneys in which the drug has been used with excellent results in the determination of renal efficiency, and reach the following conclusions:

1. The phenolsulphonephthalein as used by us has many advantages over all other functional tests thus far proposed.

2. Phenolsulphonephthalein itself is better adapted for use as a functional test than any other drug previously employed for the same purpose on account of its early appearance in the urine and the rapidity and completeness of its elimination by the kidney and the reliance to be placed on its findings.

3. The method of quantitative estimation of the amount of drug excreted is simple and exceedingly accurate.

4. It is of immense value from a diagnostic and prognostic standpoint in nephritis, inasmuch as it reveals the degree of functional derangement in nephritis whether of the acute or chronic variety.

5. In the cardiorenal cases the test may prove of value in determining to what degree renal insufficiency is responsible for the clinical picture presented.

6. The test has proved of value not only in diagnosing uremia from conditions simulating it, but also has successfully indicated that uremia was impending when no clinical evidence of its existence at the time was present.

7. The test has proved of great value in revealing the true renal condition in cases of urinary obstruction. It is here of more value than the urinary output of total solids, urea, or total nitrogen, and enables the surgeon to select a time for operation when the kidneys are in their most favorable functional condition. The improvement in the renal condition in cases of urinary obstruction, following the institution of preliminary drainage, is strikingly indicated by this test.

8. In unilateral and bilateral kidney disease the absolute amount of work done by each kidney, as well as the relative proportion, can be determined when the urines are obtained separately. We do not feel that this is always mathematically accurate, but in our series it has indicated the functional capacity to a degree not attained by any other test.

Boyd¹ states that until the use of this drug was discovered there was no reliable method of testing accurately the functional ability of the kidneys. In this drug we have a non-toxic substance which appears rapidly in the urine, is quickly eliminated by the kidneys without any untoward action upon them, and the amount passed is rapidly, easily

¹ Journal of the American Medical Association, 1912, lviii, 620

and accurately determined by the colorimeter. The time required for the test is short. The amount of dye eliminated is an accurate indication of the extent of renal impairment. There is no pathological condition of the kidney which allows increased permeability of the drug. The amount of dye passed does not depend on the amount of urine in which it is passed; 40 per cent. has been recovered in 5 c.c. of urine.

Pilocarpine. The conclusions reached by Ewing¹ in his study of the effects of pilocarpine and atropine upon the amylolytic power and composition of the saliva are as follows:

1. The volume of the normal saliva, its amylolytic power, and the amount and percentage composition of solids excreted, remain approximately constant during a continuous period of secretion of six or eight fifteen-minute periods. If there is any change, it is very slight falling off of the percentage composition of organic solids, and at times of the amylolytic power.

2. Pilocarpine reduces the relative amylolytic power of the normal saliva from 30 to 60 per cent. Although the relative amylolytic power of the saliva is much diminished by pilocarpine, the amount of maltose produced in the total volume of saliva secreted in a given period, after the administration of this drug, is greater than that produced by the amount of normal saliva secreted in the same length of time. "The efficiency" of the secretion is, therefore, increased by pilocarpine.

3. Pilocarpine increases the amount and tends to increase the percentage of both the organic and inorganic solids of the saliva; the greatest increase is in the organic constituents, however, any percentage increase of the solids is not nearly so great as the increase in the actual amount secreted.

4. Atropine diminishes the amylolytic power of the saliva from 15 to 30 per cent.

5. Both the amount and percentage composition of total solids secreted are greatly diminished by atropine. The decrease is in the organic constituents.

6. Pilocarpine and atropine affect the factors which influence both the "trophic" and "secretory" elements of the saliva.

7. The effect of pilocarpine and atropine upon the secretion or activity of the ptyalin of the saliva bears no definite relation to the action of these drugs upon the other physicochemical properties of the secretion.

Pituitary Extract. Klotz² writes from the gynecological clinic at Tübingen, of which Sellheim is director, to call attention to his success in the treatment of rachitis with pituitary extract. The coloring matter of the hypophysis is particularly rich in phosphorus and hence

¹ Journal of Pharmacology and Experimental Therapeutics, September, 1911.

² Münch. med. Woch., 1912, lix, 1137.

theoretically seems indicated in rachitis. He supplemented it with calcium carbonate to supply material for bone growth, and states that within five or six weeks the 5 children so treated became transformed. The effects observed in these cases and in osteomalacia, suggest, he states, that the true cause of both this and rachitis is some disturbance in the phosphorus rather than in the calcium metabolism. A number of clinical and experimental facts sustain this view.

"The relation of the hypophysis to diabetes insipidus" is commented upon by Frank,¹ who remarks that the importance of this gland upon the growth of the organism has been proved physiologically in the cells of the front lobe of the hypophysis, while the cells of the intermediate stratum produce the effective material of the watery extracts, especially the pituitary diureticum. Clinically, it can be demonstrated, supported by experimentation, that the pars intermediae has an influence upon the action of the kidneys, and that diabetes insipidus of man can be traced to a pathological overproduction of the gland. But not all cases of diabetes can be traced to such a source. The theory would be adaptable only to such cases as would occur as a sequence to cerebral affections. The other class of diabetes insipidus the author calls idiopathic, and divides it again into luetic and hereditary types. He believes that the luetic idiopathic cases could also be shown to be of pituitary origin. These two points he takes for granted, while he thinks that the hereditary diabetes can also be traced to pituitary origin in such a way that there exists in these persons an hereditary overstimulation of the glands.

Quinine. "How to use quinine and urea hydrochloride, especially for systemic effect by injection in malaria and pneumonia," is discussed by S. S. Cohen.² He reminds us that quinine and urea hydrochloride—long known in Germany as chinium bimuriaticum carbamidatum—has, within a few years, come into prominence as a local anesthetic. Cohen does not discuss its use as such, except to call attention to its great value in acute tonsillitis and in tuberculosis of the larynx. A solution of 1 to 10 or less is usually strong enough, but even a 20 to 50 per cent. solution may be employed, if necessary. It can be applied by spray, sponge, brush, cotton applicator, etc., as may be most feasible in the individual instance. Sometimes the patient may simply take a teaspoonful or two of the solution in his mouth and, holding it back toward the painful region of the tonsils or epiglottis, move it gently to and fro by action of the pharyngeal muscles. This is somewhat easier than gargling, and gives more relief. Done ten minutes before the taking of food, it will sometimes permit nourishment to be given in cases of ulceration of the epiglottis or other painful tuberculous lesion in which all other methods of relief have proved unavailing.

¹ Berlin. klin. Woch., 1912, February, 26.

² Medical Times, March, 1912. American Journal of the Medical Sciences, January, 1912.

Neither in tuberculosis nor in tonsillitis need the patient be apprehensive of any danger from swallowing the solution, as a dose of 5 grains or so, three times a day, would not ordinarily be hurtful, and in febrile cases might be beneficial. Sometimes, indeed, the specific direction to swallow a part of the solution, or even all of it, is given.

It is, however, more particularly with the systemic effect of the drug, and its administration in malaria and in pneumonia that this note deals. In regard to the use of quinine in the treatment of pneumonia it should be remembered that for many years this drug has been advocated from time to time as being almost a specific for pneumonia. This, however, has always lacked general confirmation.

The drug may, of course, be given by the mouth in solution, powder, or capsule, as any other salt of the cinchona alkaloid. It is probably more active, grain for grain, than any other quinine preparation. Possibly the urea is a linking body; possibly it is merely a question of solubility. Cohen asserts he does not know the explanation, but the fact is evident.

The peculiar advantage of the urea compound over the other quinine salts, however, is its availability for hypodermic and intramuscular injections; possibly for intravenous injection also, although he has never found the latter method necessary, and thus has no experience to report. A possible danger is injury to the vessel wall.

The superiority of the carbamide for injections is owing to its high solubility. It will dissolve in its own weight of water, especially hot water, and an ordinary syringe-ful may thus contain from 15 to 18 grains (1 to 1.2 grams) if necessary. The preferable solution is 50 per cent., and the ordinary dose is 1 gram (15 grains) in 2 c.c. of water.

In malaria of the types ordinarily seen in northern latitudes, a single injection of this strength will cause suspension of the paroxysms for from a week to a fortnight (six and one-half to thirteen and one-half days). One injection daily for a week suffices to bring about complete recovery in the ordinary case. After this, to make sure against chronic infection or sequels, the drug should be continued in doses of 10 grains in capsule, by the mouth, daily for another week; and then administered once a week, in the same way, for two or three months.

Thymol. Bozzolo,¹ in 1881, discovered that thymol was efficient in expelling the hookworm. In a recent article² he recalls the extraordinary results obtained in the treatment of uncinariasis in Porto Rico. The first report of the Commission appointed to attack the problem in Porto Rico reported 4474 cases cured; later in 1911, 47,000 were reported as having been cured.

Bozzolo states that as much as 12 grams of thymol have been given in twelve hours, 2 grams every two hours, always well enveloped in

¹ Journal of the American Medical Association, June 8, 1912.

² Ibid.

capsules, and no serious disturbance was noted; in 1 case, the dose was increased to 15 grams. Where after-treatment, and when examination of the feces showed an absence of ova, the patient remained anemic on discontinuing treatment, the hemoglobin content increased rapidly when fresh doses of thymol were given. This absence of ova in the feces is due either to the inability of the female parasites still in the intestines, but under the poisonous influence of the thymol, to renew the eggs, or because all female worms have been expelled and a few male parasites still persist, which seem to prove that the female hookworms are first expelled because most readily affected by the anthelmintic. Treatment continued, even in small and repeated doses, affects the remaining parasites, which gradually detach themselves from the mucosa, and may even then be digested by the intestines (usually the ankylostoma occupy the duodenum) and be voided. The author advises 12 grams of thymol for an adult, in two equal parts, well enveloped in capsules, to be taken at two-hour intervals, followed by a small glassful of strong wine or some alcoholic mixture. The thymol may be given in fine powder mixed with powdered sugar, or with precipitated chalk.

Schultz¹ concludes after a study of beta-naphthol, male fern, eucalyptus, chloroform, and thymol, that he is justified in reaching the following conclusions:

1. Any practical vermifuge, to be effective in expelling uncinaria or ankylostoma, must be an irritant of sufficient intensity to cause the parasite to loosen its hold.
2. It should paralyze the neuromuscular apparatus to hinder the parasite from making fresh attachment.
3. Its relative toxicity for the parasite must be either much greater than that for the host, or be much more readily absorbed by the former than by the latter.

Each of the above remedies is absorbed more or less from the alimentary tract, and Tenholt has even gone so far as to assume that only such drugs as are absorbed can be active in expelling ankylostoma. Since their method of taking food is by way of the mouth, they must of necessity be poisoned by ingesting the tissues of the host already impregnated with the toxic substance, and if the host does not absorb sufficient thymol, beta-naphthol, male fern, etc., they remain fixed to the intestinal mucosa and are not expelled by the purgative.

The author's present experimental data suggests that this is at best only a part of the truth. It happens that drugs like thymol, when combined with iodine or the benzole radicle, are much less active vermicides than thymol itself. It is also true that thymol iodide, being much less soluble than thymol, is absorbed to a less extent by the

¹ Journal of the American Medical Association, September 30, 1911.

intestinal mucosa. *A priori*, this would seem to support the idea of Tenholt that thymol iodide has no action on hookworms because none of the drug is absorbed by the host. But if the worms themselves be studied in contact with solutions each of thymol and of thymol iodide, it is possible to explain the reaction of the worms toward the two drugs on the basis of amount of drug in actual contact with the parasite and the effect of introducing the iodine atom into the molecule, and thus lowering its toxicity. While, therefore, the drug absorbed by the host and ingested by the parasite as a part of the cell and plasma may have a toxic action on the worms, it seems that such drugs as thymol, male fern, chloroform, and beta-naphthol act by direct contact with the worms, causing rapid vermiform movements, and if the irritation is sufficiently great, the worms finally attempt to escape. From now on until paralysis sets in, not a little of the surrounding media is ingested, since the mouth parts of the parasite are kept in constant action. At this stage the intestinal contents of the host ought to be expelled so as to get rid of the surplus drug and the poisoned or anesthetized worms. Judging from the action on the worms *in vitro*, two or three hours seem to be about the time when the cathartic should begin its work. In the case of chloroform and eucalyptus, the cathartic, in the form of castor oil, works hand-in-hand with chloroform.

In conclusion, it may be said that at present thymol is one of the most toxic vermicides for ankylostoma thus far proposed. It is easy to obtain, keeps well, is cheap, and is easily administered; it kills the parasites instead of merely paralyzing them. When taken under the direction of a physician who is careful to gauge the dose in accordance with the physical condition of the host, it seems to be the best all-round remedy thus far studied. While dangerous in large doses, it differs from beta-naphthol, male fern, and chloroform in that the danger is at once apparent, and can be controlled by heart stimulants and by methods that help maintain a good blood pressure until the drug has killed the parasite and the cathartic has removed the excess of thymol. Whereas with the other remedies just mentioned, the danger signals are less obvious, and usually it is only after irreparable damage is done that one is aware that his patient is in danger of any after-effects.

Beta-naphthol is probably the next pure chemical substance that ought to be tried more extensively on human hookworm subjects. Persons affected with kidney lesions ought not to take it, and, when used, the urine should be examined to determine whether it causes albuminuria. If the maximum dosage of 2 to 4 grams, divided into two parts and given an hour apart, does not cause renal disturbance in adults, beta-naphthol has much to recommend it as a hookworm remedy.

Male fern at present has not much promise in this country, because

of the lack of care in collecting the rhizome and in preparing an active ethereal extract. This, however, is a condition which doubtless would soon be remedied if once considerable demand existed for an active extract.

At present there is but little reliable data as to the efficiency of "Hermann's mixture" for expelling human hookworms, or what percentage of cases might show after-effects. It seems unnecessary to add such an irritating oil as eucalyptus globulus, and, if chloroform is used, it ought to be given with plenty of oil. It is best to divide the maximum 3 c.c. dose, for a vigorous adult, into three parts, 1 c.c. of chloroform to 10 c.c. of castor oil, given at hour intervals. Should vomiting occur before the chloroform is taken, stop the treatment, and, if necessary, change to thymol or beta-naphthol. By thus regulating the dose of chloroform, the author has had excellent results with dogs; it has proved rapid in its action, and thus far not followed by any evil after-effects. Should the chloroform-castor-oil mixture act as favorably in human beings as it has in dogs, it will prove a universal worm remedy of great importance.

Schultz, however, emphasizes the fact that the best of remedies are but weak instruments of defence in stamping out this degrading disease. The weapon of offence must, after all, be proper disposal of fecal matter so that infection is rendered impossible. And what can be more effective in accomplishing this than the cultivation of a healthy public sentiment which will insist on its communal rights in this matter, protect the innocent, and by proper police regulation, quickly punish the offender? To this end it would seem that the most effective line of attack is that led by Stiles and others, who are endeavoring to educate the masses as to the importance of proper sanitation. This view is also strongly upheld by Endicott.¹

Salicylates. In PROGRESSIVE MEDICINE for 1911, I discussed the salicylates and their therapeutic value in rheumatism, their method of administration by hypodermic injection, and intra-articular injection by electrical methods. Lambert,² in his paper, emphasizes the fact that when using salicylates in rheumatism if within forty-eight hours a distinctly beneficial action is not obtained with the form of salicylate that is being used for the patient, some other form of the drug should be employed. Most patients are easily irritated by salicylic acid, and their stomachs soon reject it, yet these same patients will readily take sodium salicylate with no disturbance. Sodium salicylate, if given in solution with an excess of alkali, is infinitely less irritant to the gastric membrane than when given in powder form. Some patients cannot take sodium salicylates, and yet they tolerate oil of wintergreen in large doses and rapidly respond to it. This natural oil of gaultheria is

¹ Journal of the American Medical Association, September 30, 1911.

² Ibid., 1911, lvii, 898.

no longer on the market, but the *oleum betulæ*, or oil of sweet birch, contains the same natural methyl salicylate. The natural salicylates seem to be less irritant, and are more active than the synthetic salicylates. Synthetic methyl salicylate is not suitable for internal use, and should only be used externally. Lambert mentions salol, salicin, and salophen as forms of salicylates that may benefit when the more usual remedies fail. He particularly recommends salicin for rheumatic affections in children and in the aged, as the form which is the least depressing and from which the most benefit seems to be obtained. Results from the use of aspirin in rheumatism have been disappointing to Lambert personally, although it is highly spoken of by some. He recommends highly a form of salicylate, the use of which seems to reduce to a minimum the irritating and toxic symptoms. The salicylate is prepared as follows: *Oleum betulæ* is saponified either by superheated steam or caustic alkali; the resulting methyl alcohol is driven off by heat, and the resulting salicylate is decomposed by sulphuric acid, it is purified by recrystallization, it is mixed with an excess of sodium bicarbonate, and made into tablets with a sugar binder. These tablets are freely soluble in water, with a pleasant acid taste and with a free elimination of carbon dioxide. Lambert says that this form of salicylate enables one to get a large amount of active salicylate into the circulation at once in the least toxic and most effective form of the natural salicylate. It is unfortunately doubtful whether they will be in general use because of their expense. It is an exceedingly active and useful form of salicylate, however, with a maximum of rapidity of absorption, effectiveness of absorption, and a minimum of toxic action.

In a study undertaken to settle the question as to whether there is any difference between natural and synthetic salicylic acid, Waddel¹ has reported results which seem to prove conclusively that the various forms of the acid are essentially the same.

In an editorial² comment on Waddel's results it is pointed out that the first feature of the investigation is not the question whether there are impure or adulterated specimens of the synthetic salt on the market, but whether there are essential differences between the pure natural and the pure synthetic drugs; the answer of the present investigation to this question is emphatically a negative one as far as toxicity is concerned.

Glaesgen³ has found that the salicylates induce an albuminuria when given alone. The administration of from 6 to 10 grams of sodium bicarbonate in the course of twenty-four hours is sufficient to prevent this albuminuria. Thus the kidneys are saved, which may be of

¹ Archives of Internal Medicine, December, 1911.

² Journal of the American Medical Association, 1912, lviii, No. 2.

³ Münch. med. Woch., 1911, lviii, 1125.

distinct advantage in the treatment of patients who have had a previous kidney lesion. The therapeutic action of the salicylate did not seem to be modified by the alkali. In general, twice as much of the alkali as of the salicylate was necessary to prevent this albuminuria in the cases studied by Glaesgen.

Three cases are cited by Waller¹ to prove his contention that salicylates have a powerful influence against thyroid activity. For instance a robust adult had an acute tonsillitis. He had stuck to his work for three or four days when Waller first saw him one morning. He had then taken to his bed with a pulse rate of 120, and temperature 102° F. He had headache and pains in the limbs severe enough to suggest rheumatism, but possibly only influenzal. He was given a mixture containing 15 grain doses of sodium salicylate and $\frac{1}{2}$ grain doses of compound tincture of cinchona. But owing to variations in the size of the domestic tablespoon, he repeatedly took a larger dose, roughly 20 grains of salicylate and 40 minims of bark every four hours. He then had a (morning) pulse rate of 48, and temperature of 96.4° F. He had sweated profusely the first night, and his bowels were obstinately constipated, resisting strong doses of an aperient. The pulse and temperature remained at this low level all the next day, and the bowels were still obstinately constipated in spite of aperients, though the salicylate mixture had been stopped. Thyroid extract, $2\frac{1}{2}$ grains, twice a day, was then given for two days, and the temperature again rose, this time to nearly 101° F., and the pulse to 98. The throat progressed rather slowly in spite of energetic antiseptic treatment which had given excellent results in other cases. The patient returned to work twelve days after Waller first saw him, when, in spite of full doses of strychnine, he had a very soft dicrotic pulse of 76, and a blood pressure of only 100.

Scharff² has for some time been advocating a salicylic acid, turpentine, and sulphur ointment, which, in fifteen years' experience, he has found extremely efficient in rheumatic and rheumatoid affections. Each of the four ingredients is active in combating rheumatism, and the urine soon gives the reaction for the salicylic acid, showing that the drugs are absorbed. The formula is:

R ^y —Acidi salicylici	10 parts.
Solve in ol. terebinthinæ	10 parts.
Sulphuris præcip. vel sublimati,	
Terebinthinæ	āā 40 parts.

In a typical case described in detail, it promptly cured a woman who had been absolutely helpless from very painful rheumatism involving every joint. She was able to move only her head. The salve is applied

¹ Lancet, London, September 9, 1911, p. 743.

² Therap. Monats., February, 1912, p. 89.

to the parts and covered with oiled silk or rubber tissue or dusted with powder. The oiled silk generally sticks to the skin and may require no further dressing except the clothing to hold it in place. On exposed regions, a starched dressing outside may be found useful to protect the part. The sensation ranges from an agreeable warmth to smarting, but the smarting is generally bearable, and is gone in less than half an hour. The salve is left unmolested for from three to five days, and is then renewed if the skin is not too sensitive; otherwise a soothing application is made at first. He has cured in this way in a week all his patients with acute articular rheumatism, thus sparing the stomach the internal salicylic medication. He has found his salve useful also in myositis, sciatica, and other neuralgias, in attacks of gout, tendon sheath lesions, contusions and sprains, the pain-soothing and hyperemia-inducing action of the salve under its air-tight covering promptly curing the trouble, especially when supplemented by massage and electricity.

Drinkwater¹ says that a large proportion of the patients who suffer from rheumatic sore throat are anemic. When the pharynx is decidedly pale he has found more benefit to result from the employment of sodium salicylate in combination with ferric chloride than from the sodium salt alone. The preparation he uses is as follows:

R—Sodium salicylate	3j
Solution ferric chloride	3ss
Potassium bicarbonate	3j
Water	q. s. f3 viii.—M.

The iron must be mixed with the salicylate before the potassium bicarbonate is added to either of them, otherwise an insoluble ferrous carbonate is formed and carbon dioxide is given off. The sodium salicylate and the potassium bicarbonate should each be dissolved in water before being put in the mixture; then if the ingredients are introduced in the order given in the prescription, the final result is a clear claret-colored mixture without a trace of deposit or effervescence. The iron and salicylate form a thick, curdy, purple precipitate which dissolves on the addition of the potassium salt. Theoretically, 218 grains of sodium salicylate are equivalent to the iron in 1 ounce of the solution of ferric chloride, but, practically, not more than one-fourth of this amount of iron can be used, otherwise the mixture will effervesce when the bicarbonate is added.

Squill. Ewins² believes that the toxicity of squills is in all probability due to the presence of at least two active principles. (1) A glucosidal substance very easily soluble in water, and resembling in many respects the water-soluble strophanthin. This substance has been isolated in

¹ Practitioner, January, 1912.

² Journal of Pharmacology and Experimental Therapeutics, 1911, iii, 2, 101.

an approximately pure form, but so far has not been crystallized. The minimum lethal dose of the product is 0.03 mg. for a frog of about 25 grams in weight, death being produced by the stopping of the heart in systole. (2) A resinous product very slightly soluble in water, readily soluble in alcohol, and not precipitated by ether from its alcoholic solution. The minimum lethal dose of this product is 0.06 to 0.07 mg. per frog. From the alcoholic extract of the squill bulb a small quantity of caffeine was isolated. The base is present only in a very small quantity (0.01 per cent. of the dry bulb.)

Strophanthus. Fraenkel¹ advocates systematic repeated intravenous injections of strophanthin when digitalis is not borne or has lost its effect in chronic heart disease. The drug is especially indicated when pulmonary congestion develops as a result of acute dilatation of the heart. In a typical case related in detail, of chronic valvular defect and degeneration of the myocardium, with lost compensation and congestion in the liver, digitalis was not borne by the mouth, but, under small intravenous injections of strophanthin, the patient was kept in fair condition for a year and a half, and then treatment was suspended, as the improvement was so marked. She was a woman aged forty-eight years, and she had required tapping eight times and eighty-five intravenous injections of strophanthin had been made in eighteen months. He commenced with half a milligram and repeated the injection only when the favorable effect had died out. The doses ranged from a quarter to a whole milligram, the total amounting to 0.0845 gram strophanthin. At the end of the course the ascites had nearly entirely subsided, the liver was much smaller than at first, and the patient could walk on level ground without shortness of breath, and she was able to sleep without the morphine she had previously required. Progress in this method of therapeutics, he says, is not so much in the choice of a preparation of strophanthus as in the systematic and cautious manner of its use and study of indications requiring the medication by the mouth or by the intravenous route.

Strychnine. An editorial article in the *Journal of the American Medical Association*² calls attention to the uncertainty of our knowledge regarding the effect of strychnine on the blood pressure. While toxic doses of the drug undoubtedly raises the blood pressure in animals, it is not very clear that given in medicinal doses, the drug has any such power in human beings. What evidence is at hand gives such divergent results that no definite conclusions can be drawn.

The editorial cites a paper of Cabot's in which he reports 50 cases, all febrile, in which the results from strychnine were negative, so far as the blood pressure was concerned. Cabot took the blood pressure for days at a time, the patient receiving from one-eighth to one-sixth

¹ Münch. med. Woch., lix, No. 7, 345.

² Vol. lviii, p. 414, 1912.

of strychnine daily; the drug was administered in some cases by mouth, and in others hypodermically.

In contrast to Cabot's results, those obtained by Cook and Briggs¹ are cited. These observers made blood pressure estimations in patients suffering from a wide diversity of conditions, including shock, child-birth, febrile conditions, etc. The blood-pressure readings were made at five-minute intervals preceding and following the administration of various drugs. Strychnine was given hypodermically in doses ranging from $\frac{1}{60}$ to $\frac{1}{10}$ of a grain.

As a result of their study, they are led to conclude that strychnine gives a rise in blood pressure which is delayed in onset, but lasts from one to four hours.

The drug is most satisfactory for continued use in cardiovascular cases, as it tends to maintain a uniform pressure free from intervals of depression.

The drug failed to raise the pressure in moribund and hopeless cases; in normal individuals with an apparently healthy cardiovascular apparatus; and in cases in which the pressure was already maintained at a "stimulation level" by previous stimulants.

The editorial emphasizes the fact that what is needed more than anything else to settle this question is exact clinical study. Such a study should cover a variety of conditions.

Sulphur. Huerre² states that since sulphur, as such, is generally poorly tolerated by the skin, he had sought to combine it with various oils, and had found that a combination with castor oil gave the best results. By heating oils with sulphur to 106° C., a true compound—a sulphurated oil—is formed, which is advantageous in that it may readily be associated with substances in general use in dermatology, such as chrysophanic acid and pyrogallol. Salts of mercury may also be easily incorporated in the oil.

Thyroid Extract. It is held by French³ that there is clinical if not experimental evidence to show that between normal people, on the one hand, and myxedematous or cretinoid persons, on the other, there is a wide field within which come cases in which more or less severe symptoms may be attributed to what he calls hypothyroidism; that is to say, deficient activity of the thyroid gland, but not complete absence of its secretion. Of the many groups into which these cases might be divided, in all of which some at least of the patients are materially benefited by the administration of suitable doses of thyroid extract, are the following: (1) The infantile idiot type. (2) Children backward in walking or in talking. (3) Backward boys or girls, especially some suffering from nocturnal enuresis. (4) Stout sterile women of child-

¹ Johns Hopkins Hospital Reports, vol. xi.

² *Revue de Thérapeut. Med.-Chir.*, March 15, 1912.

³ *Clinical Journal*, London, 1912, xxxix, 321.

bearing age. (5) Women who tend to become very stout at or about the menopause. (6) Certain sufferers from functional nerve symptoms, notably, exaggerated subjective sensations of acroparesthesia and the like after the menopause, and most particularly one type of that of little understood but very severe malady, tic douloureux.

"*Enuresis and Thyroid Extract*" formed the basis of a paper by Firth.¹ He says that the cases which appear to react to this form of treatment better than all others are those in which the enuresis has persisted since birth, and in which the patients are also backward. He had 5 of these cases, all of which showed marked improvement. Seven cases with enuresis from birth were stated to be quite satisfactory as to the mental condition, and only 1 of these improved. Of the 16 cases in which the enuresis started during childhood, 6, out of the 10 improved, were backward compared with 2 out of 6 not improved. The duration of the acquired enuresis was of no importance in prognosis.

In 7 cases in one group, hypertrophy of tonsils and adenoids were present, and 4 had undergone operation for this condition. In another group, 4 children were similarly affected, and 1 child had them removed. In no case could any connection be traced between operation and enuresis. In no case could the enuresis be ascribed to the genitalia, while threadworms had been noticed in 3 cases of those improving, and in 2 cases among those who received no benefit by treatment. In 3 cases, the enuresis could be traced to a definite exciting cause—an operation for hernia, scarlet fever, and enteric fever respectively. The first of the cases was cured, but the other 2 did not respond well to the treatment.

An attempt was made to obtain data for controlling the effects of the thyroid extract from observations on the pulse, temperature, and weight. The pulse rate did not give any definite evidence of overdose until diarrhea commenced, and showed wide variations in uncomplicated cases. Had the children been under observation in hospital where the pulse could have been recorded twice daily, thyroidism would probably have been detected by the increased pulse rate before the onset of diarrhea made it obvious, but a weekly attendance and the likelihood that the accompanying excitement will disturb the pulse rate seem to render the pulse an untrustworthy guide, and to explain the difference noticed, for which no definite cause could be otherwise assigned.

The temperatures were taken in the rectum, and varied between 98° and 100° F. before treatment commenced; all cases except 5 showed an average rise of about 1° while under treatment, but there was no distinctive feature about the behavior of the temperature in any group.

¹ Lancet, London, 1911, clxxxi, 1535.

Levi¹ found that thyroid treatment arrested permanently all tendency to *asthma* in a number of his patients; in some, the asthma was of twelve or fifteen years' standing. He published 9 such examples last year, and has since encountered 14 more. Migrain and other symptoms of the neuro-arthritic diathesis are common in the patients amenable to this treatment, and they yield with the asthma to medication to remedy the defective thyroid functioning.

Vaccines. VACCINE TREATMENT OF SIMPLE GOITRE. McCarrison,² in studying the amebic flora of the intestine in cases of endemic goitre in India, was led, by the uniformity of the bacterial growth, to try the effects of a vaccine made from this composite growth upon some of the cases. The effects were striking, there being a prompt decrease in the size of the enlarged gland and complete recovery in many cases. Upon examination of this bacterial growth, it was found to consist mainly of a somewhat altered type of colon bacillus. He therefore used a vaccine made from this alone, and obtained similar good results. He also tried the effects of a vaccine made from a staphylococcus and one from a spore-bearing bacillus, with favorable results from both. He treated 33 cases in all, with most excellent results, but calls attention to the fact that the treatment is suitable for recent cases of parenchymatous goitre only. The results were best when the composite vaccine was used. By way of explanation of the action of these varied vaccines, he suggests that the cases are due, as he has previously shown, to an ameba in the intestine; that the thyroid is the means of combating certain toxins normally present in the intestine; that when to these there is added the specific virus of goitre (from the ameba) there is an extra strain put upon the gland, and in consequence of this it undergoes hypertrophy. By the use of one of the vaccines, which in itself is in no way specific for goitre, there is removed from the thyroid gland the added strain of neutralizing the toxins arising in the intestine from the bacteria there present, and the gland is able to return to its normal size and take care of the specific toxin of the disease. This conclusion is substantiated in part by experiments upon animals.

PNEUMONIA. Rosenow³ has succeeded in separating from virulent pneumococci a large part of the toxic material which goes into solution on autolysis, and have left in the pneumococci that part which stimulates antibody formation more promptly and more energetically without first producing a negative phase. The number of "detoxicated" or autolyzed pneumococci inoculated can now be much greater than those merely killed by heat. When this material is inoculated within forty-eight hours after the onset of an attack of lobar pneumonia, the course of the disease is often seemingly much modified. The temperature

¹ Archives Générales d. Méd., Paris, 1912, xci, 197.

² Lancet, February 10, 1912.

³ Illinois Medical Journal, 1912, xx., 399.

comes down within twenty-four to thirty-six hours, and the patient recovers promptly; when given later, as would be expected, the effect is less pronounced. In a series of cases at the Cook County Hospital last winter, 50 treated and 50 alternate untreated cases, used as a control, the mortality of the former was 32 per cent., while in the latter it was 50 per cent.

Raw¹ treated 207 cases of lobar pneumonia by a *stock pneumococcus vaccine*. The total mortality in the cases treated was equivalent to 16 per cent. Raw notes, as a striking feature that he attributes to the vaccine treatment, the total absence of empyema in this series of cases, and the development of but few other complications. However, he saw no effect in hastening the appearance of the crisis or in shortening the duration of the disease. Raw says he is convinced that we have in pneumococcus vaccine a valuable aid in the treatment of pneumonia, and although not a specific remedy, it ought always to be used in cases of a virulent type.

RHEUMATIC POLYARTHRITIS. Wolverton² used vaccine therapy in acute rheumatic polyarthritis, but admits that 6 cases do not form a large series from which to draw conclusions. All his cases were of a very severe character, and the response to the exhibition of *Streptococcus pyogenes* vaccine was in every case so prompt and satisfactory that he has felt impelled to report his cases and to urge others to give the remedy extensive clinical trial. Moreover, in at least 4 of the 6 cases, the salicylate treatment was not followed; and in 2 cases the patients grew worse in spite of faithful adherence to salicylate treatment. So the uniformly good and prompt results must be ascribed to the vaccine. In every case the temperature quickly fell, there was a rapid cessation of pain and disappearance of signs of inflammation. The patients, moreover, remarked a feeling of exhilaration, or stimulation, which came on in from three to forty-eight hours after the inoculation. In no case was there any evidence of a harmful negative phase. In none of the 6 cases above reported did any cardiac valvular lesion develop subsequent to the employment of the vaccine.

Considering the unsettled nature of the question as to the specific etiological microorganism in this disease, it seems not unwise to the writer to employ a mixed vaccine, containing *streptococcus pyogenes* and *staphylococcus aureus* et *albus*, rather than the *streptococcus* alone. However, the plain *streptococcus* vaccine used in the cases reported above left nothing to be desired.

The vaccine employed in the treatment of the cases were all "stock" vaccines made from several strains (at least six, he believes) of *streptococci* obtained from various cases of *streptococcic* infections.

¹ Lancet, 1912, clxxxii, 464.

² Medical Record, October 28, 1911.

TYPHOID FEVER. The wonderful sanitary record of the Maneuver Division of the Army at San Antonio is reported by Kean,¹ who compares the statistics with those of one of the camps in 1898. The most important feature of his report deals with typhoid fever prophylaxis by means of typhoid vaccine. Eight thousand and ninety-seven men were vaccinated. In no case was the operation followed by serious results, and in 90 per cent. of the cases the reaction was mild or absent. In the entire division there was only one case of typhoid fever. "This patient, a private in the hospital corps, had not completed his immunization, having taken only two doses. The case was very mild, and would perhaps have been overlooked but for the rule that blood cultures were made in all cases of fever of over forty-eight hours' duration." During the time covered by this report 49 cases of typhoid fever, with 19 deaths, were reported in the city of San Antonio. Compared with the typhoid morbidity and mortality at Jacksonville, Fla., in 1898, the results at San Antonio show the extent of the advance. In Jacksonville, among 10,759 men, there were 1729 certain cases of typhoid fever (including the probable cases of typhoid, there were 2693), of which 248 resulted fatally.

The report of the Commission of the French Academy of Medicine on antityphoid vaccination is commented upon by *The Boston Medical and Surgical Journal*.² As a result of examination of numerous data, the Commission reached the following conclusions, which were unanimously adopted.

There are grounds for recommending the voluntary employment of antityphoid vaccination as a rational and practical method of diminishing, by a sensible proportion, the frequency and gravity of typhoid fever in France and in the French colonies.

This recommendation is addressed to all whose profession, whose usual or accidental methods of alimentation, whose daily or frequent association with the sick or with bacillus carriers, expose them to direct or indirect contagion by the bacillus of typhoid fever.

The groups of persons designated as likely to be particularly benefited by antityphoid inoculations are:

(a) Physicians, internes, medical students, male and female nurses in military and civil hospitals.

(b) Members of families in which bacillus carriers have been demonstrated.

(c) Young persons of both sexes who have come from salubrious regions in the country to cities which are habitual foci of typhoid fever.

(d) The population of cities where the latter disease is frequent.

¹ Journal of American Medical Association, 1911, lvii, 713.

² October, 19, 1911.

(e) Soldiers and sailors (rank and file) sent to colonies where typhoid fever is epidemic or endemic.

Following the remarkable results obtained in the U. S. troops at San Antonio, the Navy Department has also made compulsory the use of typhoid vaccine for prophylactic purposes.

The definitely proved efficiency of typhoid vaccine and its harmlessness will undoubtedly lead to its employment by those who travel and are exposed to all sorts of water supplies. The immunity given lasts for about two years and a half.

Venesection. Zweifel¹ applied venesection in 57 of his 71 cases of postpartum eclampsia, and almost invariably the convulsions ceased after the venesection. All the patients thus treated recovered. He is confident that venesection never did any harm, while all concerned were impressed with the benefit from it; it proved a life-saving measure in many cases. Recent research by himself and others has demonstrated that, in eclampsia, the blood is much more concentrated than normal. This is an additional argument in favor of venesection, while it explains the aggravation of the eclampsia liable to follow sweating procedures. Stroganoff's prophylactic method is the routine treatment of eclampsia followed in his service, often supplemented by venesection when the convulsions keep up after delivery. Mace has reported 11 per cent. mortality in 27 patients treated by venesection alone; Potocki 2 in 12 cases, and Saint Blaise no mortality in 14. In conclusion, Zweifel protests against the practice current in his district of forcing a person in syncope or otherwise unconscious to swallow some water. The laity have an idea that this is the proper thing to do; the fluid is not swallowed, but gets into the lungs, and this was the cause of 3 of the 8 deaths in his service last year, the patients succumbing to pneumonia that developed in consequence. He urges that physicians should impress repeatedly on midwives and others that nothing should be given by the mouth to unconscious persons.

¹ Archiv f. Gynäk., Berlin, 1912, xevii, 1.

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